

## PEARSON ISLAND EXPEDITION 1969†—9. HYDROIDS

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### Summary

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Intensive collecting of the sublittoral hydroid fauna of Pearson Island in the Great Australian Bight, in January, 1969, yielded 81 species (with 3 varieties in one species), of which 13 species are newly described. There are 18 new records for South Australia and 1 new record for Australia. The collection permits a fuller description of several hitherto poorly known southern Australian species.

Collections were made using SCUBA at 3 localities representative of environmental extremes on the coastline—a rough-water site exposed to prevailing swell, a sheltered embayment, and a deep water situation in open ocean.

The deeper water fauna contained species already known from deep dredgings in the Great Australian Bight, but differed markedly from the collection from shallower water, with only 1 species common to both.

The Sertulariidae and Plumulariidae are represented by the greatest number of species, and are equally abundant in both epizoic and epiphytic habitats; the Haleciidae, Lafoeidae and Syntheciidae are epizoic, and Lineolariidae, with 1 species, epiphytic. The large plumose colonies of the Aglaopheniinae are epilithic. Hydroids are more abundant on the rough-water coastline, where red algae and the solitary ascidian, *Herdmania momus* (Savigny), are epiphytised by a large number of species. Delicate athecate species, and species of the Campanulariidae which may be expected to liberate medusae, are restricted to sheltered waters, or to depths below turbulence from surge in the rough-water locality.

The high percentage of hydroids now known to be common to the coasts of South Australia, Tasmania and Victoria, supports the view that the Flindersian province extends from Bass Strait into the Great Australian Bight.

### Introduction

Hydroids have been reported from a number of expeditions around the southern and south-eastern Australian coastline—the voyage of the "Rattlesnake" (Busk 1852), the "Challenger" dredgings in Bass Strait (Allman 1883, 1884), the "Thetis" dredgings along the New South Wales coastline (Ritchie 1911), the "Endeavour" expeditions from New South Wales to Western Australia (Bale 1914, 1915), the Michaelson-Hartmeyer Expedition to Western Australia (Stechow 1924, 1925), and the McCoy Society Expeditions to Lady Julia Percy Island, Victoria (Blackburn 1937), and the Sir Joseph Banks Group, South Australia (Blackburn 1938). With the exception of the

last two expeditions, the hydroid collections were made over a wide geographical area, while the collections of the Michaelson-Hartmeyer Expedition and the McCoy Society Expeditions, although restricted in area, were gained mainly from drift, the eulittoral zone, and to a minor extent, from shallow subtidal dredgings. No intensive survey has however, been made of the subtidal hydroid fauna at any one locality in the Australian region.

The joint expedition of the Department of Fisheries and Fauna Conservation of South Australia and the Royal Society of South Australia to Pearson I., 6-15 January, 1969, provided an opportunity to undertake a comprehensive subtidal survey of the hydroid fauna of an offshore island.

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† Other accounts of the geomorphology and biology of the Pearson Islands are given in Volume 95, Part 3 (1971) of the Transactions, as well as in the present part.

The South Australian hydroid fauna is known from reports of the "Endeavour" dredgings in the Great Australian Bight along the 126° parallel of longitude, together with a small collection from the Isles of St. Francis in the Nuyts Archipelago. Blackburn (1938) recorded the shallow water fauna of the Sir Joseph Banks Group in Spencer Gulf, and Shepherd & Watson (1970) listed and discussed the associations of hydroids and algae at West I., Encounter Bay.

The survey yielded a total of 81 species (with 3 varieties in one species), of which 13 species are new; there are 18 new records for South Australia, including 1 new record for Australian waters. Only 2 athecate species were found, and 6 of the thecate hydroids could be identified only to genus.

Pearson I. (Fig. 1) is a granitic island situated at Lat. 33°57'S, Long. 134°15'E, about

64 km offshore on the continental shelf in the eastern region of the Great Australian Bight.

Weathering of the granite has produced a rugged topography of massive blocks, clefts and caverns, continuous to the seafloor at depths of 45 m immediately surrounding the island, with a rapid increase in depth offshore to 70 m. A more detailed account of the environmental conditions is given by Shepherd & Womersley (1971).

### Methods

Collections were made by divers using SCUBA. As diving time was limited to a total of 30 hours underwater, two main sites were chosen for intensive collecting. One site was on the rough-water windward, southwesterly side of the island; the other was in the more sheltered north facing Eastern Cove (Fig. 1). The benthic flora and fauna at each site was systematically sampled (with particular attention to hydroids) from the upper sublittoral to the seafloor at 50 m depth. Two additional small collections were also made—one in sea-grass meadows in the more sheltered part of Eastern Cove, and another, at 65 m depth, 4 km to the south, between Pearson I. and Dorothee (Station F). Because of the rugged nature and exposure of the coastline to surf, no collection of the intertidal fauna was made.

### Collections

Holotype and paratype microslides, and other microslides and material are lodged in the National Museum of Victoria, Melbourne (NMV). Paratype microslides are also lodged in the South Australian Museum (SAM).

In most instances, the synonymy of Ralph (1958, 1961a,b, 1966) is adopted, and only pertinent references to species in Australian literature are given. The status of several species is reviewed to resolve confusion in the literature, and a number of rare and poorly known species are redescribed.

The site notation of Shepherd & Womersley (1971) is followed, "R" denoting material collected on the rough-water side of the island, and "S" denoting the sheltered side. Hydroids collected in deep water at Station F are noted separately. Depths at which each species was collected are given. These depths will, however, represent only part of the total range of each species. In most instances, the substrate upon which each species was found is also noted. As many hydroids are both seasonal and irregular in occurrence, it is likely that collections made at other parts of the island

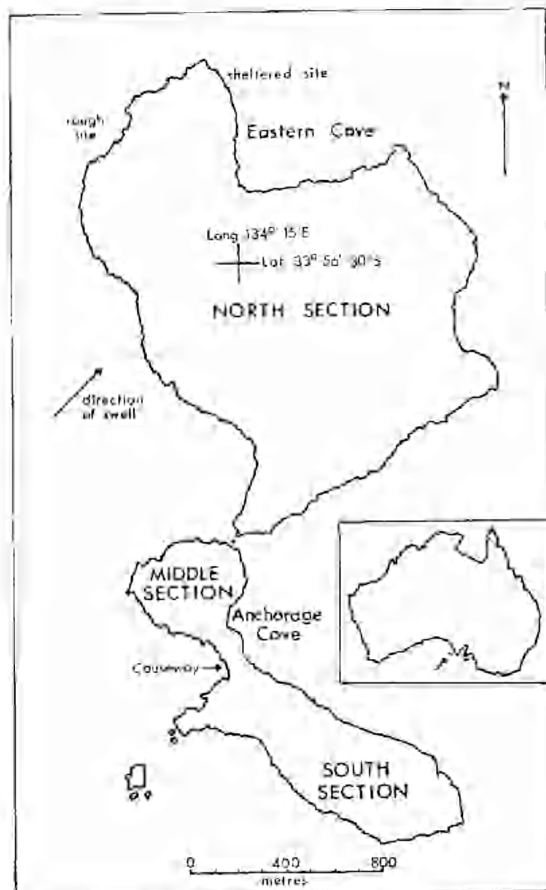


Fig. 1. Map of Pearson Island, showing study sites near the northern end. Inset shows the situation of Pearson Island in the Great Australian Bight. (After Shepherd & Womersley 1972).

or even at the same sites at other times, would yield a slightly different faunal list.

The algal ecology of these Pearson I. sites is described by Shepherd & Womersley (1971), who also list the algal species collected.

### Ecology

#### Occurrence of Hydroids

The collection yielded a large number of species, in spite of the apparent paucity of the hydroid fauna on first inspection of the locality. Many of the species are cryptic forms growing sparsely in small colonies among algae, where only accessible with SCUBA. Even those species (*Solanderia fusca*, *Thecocarpos divaricatus* var. *maccayi*, *Halicornaria longirostris*, *H. prolifera*) which are known to form conspicuous colonies in other localities, were small and attenuated, suggesting that conditions for growth were not entirely favourable. This may be due to the strong surge conditions around the island preventing good growth of the colonies, or to the high light transmittance of these waters, which appears to inhibit hydroid growth (J. W. unpublished data).

The only athecate species, *Tubularia larynx* and *Solanderia fusca*, recorded from Pearson I., were found in relatively sheltered situations on the rough-water site. Only one colony of the former species, growing deep within a cavern, was recorded, whereas the latter species occurred as abundant small colonies in sheltered situations among the holdfasts of the brown kelp *Ecklonia radiata*.

The scarcity in rough ocean waters of athecate and other species which liberate medusae has already been noted at West I. (Shepherd & Watson 1970). Thus their absence from Pearson I. is not surprising, considering the exposure of the coastline to surf. *Campanularia australis*, a species likely to liberate medusae, but whose reproductive structures are still unknown, was however common on the rough-water site, but only at a depth of 34–50 m, well below the zone of maximum turbulence.

The collection from Station F, at 65 m depth, yielded a markedly different fauna from that of shallower water. The seafloor at this station was ripple-marked sand, with rare algae, a sparse epifauna of worm tubes, calcareous bryozoa, solitary ascidians, and old shell. The dominant hydroids here were *Symplectoscyphus subdichotomus*, *S. longithecus*, *Synthecium elegans* f. *subventricosum* and *Plumularia asymmetrica*. The only species of this group also ranging into shallower water

was *S. subdichotomus* but it was uncommon. *P. asymmetrica*, the most abundant species in the deeper water, has been recorded only three times previously, from adjacent waters of the Great Australian Bight.

#### Relationship between Hydroid and Substrate

Although little firm evidence of the association between hydroids and substrate can be gained on the basis of one series of collections, a number of broad relationships and possible obligatory associations are evident from the Pearson I. material.

Of the total of 81 species and 3 varieties, 27 are exclusively epiphytic, 30 are non-epiphytic, and 18 are both epiphytic and epizoic. The holdfast fauna, although strictly epiphytic, is listed with epizoic, epilithic and "treegrowing" species (Table 3.)

#### A. Epiphytic Hydroids (Table 2).

The two major families present, the Sertulariidae and the Plumulariidae, are almost equally divided between epiphytic and epizoic species. The Lineolariidae, represented only by *Lineolaria spinulosa*, is epiphytic. Altogether, 47 species are associated with red algae, mostly on the rough-water site, 27 species are associated with brown algae, and 3 species with green algae. This is in accord with findings at West I. (Shepherd & Watson 1970) where red algae were also the most heavily epiphytised group. The most abundant and widely distributed species of algae had the greatest number of hydroid epiphytes. Brown algae, particularly *Sargassum*, although a substrate for fewer hydroids, were often heavily epiphytised by luxuriant colonies of some common species such as *Amphibelia minima* var. *pumiloides*, *Plumularia epibracteolosa* and *Sertularia avrilia*.

Several hydroids showed a high degree of selectivity and were associated with only one algal substrate (Table 2), but as these species were not of common occurrence, it is uncertain whether an obligatory relationship actually exists. However, there are two instances of a commonly occurring hydroid associated with only one species of alga. *Sertularia acuta* was found only on the red alga *Stenocladia australis*, whereas at West I. it was abundantly associated with the red alga *Phacelocarpus labillardieri*. The factors influencing the preference of *S. acuta* for *Stenocladia australis*, to the exclusion of *Phacelocarpus labillardieri*, at Pearson I. are unknown.

The most conspicuous association was that of *Plumularia epibracteolosa* with the brown

alga *Sargassum bracteolosum*. The fronds of this alga were densely covered by the hydroid, in contrast to the stems which were exclusively epiphytised by *Amphisbetia minima* var. *pumiloides*. *S. bracteolosum* was also recorded at West I., but was epiphytised only by *A. minima* and *Campanularia australis*.

Two other species, *Lineolaria spinulosa* and *Plumularia australis*, were common epiphytes on the seagrass *Posidonia australis*, but were not associated with algae. Colonies of both hydroids were frequently intergrown on the same blade of seagrass.

The growth habit of *Plumularia flexuosa* with a species of the red algal genus *Mychodea* has not previously been reported. Usually hydroids avoid algae with a thallus of small diameter (Nishihira 1967). The frond of *Mychodea* sp., although somewhat larger than the hydroid stolon, is nevertheless rather narrow. The hydroid stolon passes length wise internally through the frond, giving off stems to the outer surface at regular intervals.

Of particular interest is the gradational epiphytism displayed by the *Amphisbetia minima*-*A. minuscula* group. Bale (1884) distinguished var. *pumiloides* from var. *intermedia* entirely upon the structures of the trophosome. Both these varieties, and the closely related species *A. minuscula*, are abundant in the present collection, and display a marked gradational preference for certain groups of algae—the robust var. *pumiloides* is found on large brown algae of the genus *Sargassum* (*S. varians*, *S. verruculosum*, *S. bracteolosum*) and on *Acrocarpia paniculata*; var. *intermedia*, a small form, is associated with the red algae *Rhodymenia australis*, *Metamastophora flabellata*, *Laurencia elata*, and *Carpopeltis phyllophora*. *A. minuscula* is both epiphytic and epizoic and is associated with the red alga *Laurencia elata*, the brown alga *Distromium flabellatum*, a species of the green alga *Caulerpa*, as well as being epizoic on *Herdmania momus* and *Halicornaria longirostris*.

#### B. Epizoic Hydroids

The Lafocidac, Syntheciidae and Haleciidae (with one exception *Halecium* sp. 1) are entirely epizoic. Generally, epizoic associations are less well defined than epiphytic associations, most of the species involved being found on a wide variety of animal substrates. The substrates upon which hydroids were found were, in order of abundance, other hydroids (19 occurrences), calcareous bryozoa (15), sponges (14), the solitary ascidian *Herdmania*

*momus* (14), compound ascidians (3), and mucilaginous worm tubes (2). Of the animal substrates, only *H. momus* and other hydroids could be identified to species.

The two species of hydroids most commonly epizoitised by other hydroids are *Thecocarpus divaricatus* var. *cystifera* and *Halicornaria longirostris*, whose thick robust stems are suitable for colonisation by the small stoloniferous species such as *Symplectoscyphus epizoius*, *Reticularia antarctica* and *R. annulata*.

*Herdmania momus*, one of the most abundant larger invertebrates at Pearson I., grows upon rock walls in open situations where there is moderate water movement. The leathery siphonal region of the ascidian is colonised by small species of red algae, bryozoans and hydroids, the most commonly occurring hydroids being *Sertularella robusta*, *Sertularella* sp. 1, and *Diphasia subcarinata*.

#### C. Epilithic Hydroids

Epilithic colonies are usually conspicuous plumose forms growing from small matted rootstocks on rock surfaces in open situations where they can take maximum advantage of water movement. This group, comprising *Thecocarpus divaricatus* var. *cystifera*, *Halicornaria prolifera*, *H. longirostris*, and *H. aurea*, all belong to the Aglaopheniinae.

Closely allied in habit to the true epilithic species are the two "freegrowing" plumularian species, *Plumularia asymmetrica* and *Halopteris sulcata*. Both are large plumose colonies growing from a small rootstock attached to pebbles or shell fragments buried in the sea-floor.

#### D. Non-selective Hydroids

Species occurring in both epizoic and epiphytic habitats are often also associated with the most abundant animals and plants, and are thus among the most commonly occurring hydroids. The most frequent of these multi-preferential associations are:

Hydroid	Substrate
<i>Sertularella robusta</i>	{ <i>Ballia cullitricha</i> <i>Herdmania momus</i>
<i>Sertularella</i> sp. 1.	{ <i>Laurencia elata</i> <i>Herdmania momus</i>
<i>Diphasia subcarinata</i>	{ <i>Amanzia planatifida</i> <i>Herdmania momus</i>

Although many species (18) are both epizoic and epiphytic, only 2 species, *Thecocarpus divaricatus* and *Halicornaria longirostris* are epilithic as well. The largest of the 3 varieties of *T. divaricatus*, var. *cystifera*, is epilithic.



while of the 2 smaller varieties, var. *briggsi* is gradational between epiphytic and epizoic, and var. *maccayi* is epiphytic.

### Distribution

All thecate families, with the exception of the Campanuliniidae, are represented in the collections. Campanulariidae are represented with 5 species, Sertulariidae with 31, Plumulariidae with 31, Haleciidae with 5, Lafoeidae with 4, Syntheciidae with 2, and Lincolariidae with 1 species.

With the exception of *Thecocarpus divaricatus* var. *briggsi* (previously recorded from New South Wales), *Reticularia antarctica* (Western Australia), and *Zygophylax antipathes* (Torres Strait), all other species newly recorded from South Australia are known from Victorian waters, mostly from the intensive collecting of Mulder & Trebilcock (1909–1916) along the central Victorian coastline, from Port Phillip Heads to Torquay.

The new record for Australia, *Synthecium dentigerum*, has been reported only twice previously, once from the Indian Ocean, and once from South Africa.

The genus *Lytocarpus*, well known from the Indo-Pacific region, is recorded for the first time (*L. mulderi*) from southern waters.

Only 14 of the 38 species listed by Blackburn (1938) from the Sir Joseph Banks Group were in the Pearson I. collections. The two groups of islands, however, are subject to different environmental conditions, the former group of islands being situated in sheltered water at the southern end of Spencer Gulf, in contrast to the extreme exposure to rough water of Pearson I. in the Great Australian Bight. Comparison of the faunal lists of the two island groups shows that the species common to both are mostly species epiphytic on algae, and on the seagrass *Posidonia australis*.

### Zoogeography

Of the 83 species and 3 varieties recorded from Pearson I., 18 species are common to New Zealand waters, 15 have a northern Australian and western Indo-Pacific distribution, 10 species occur in South African waters, 6 are recorded from Japan, 2 from the Antarctic, and 2 are cosmopolitan. Thirty-nine (49%) of the species recorded (including the new species) are, as presently known, endemic to southern and south-eastern waters of Australia.

Blackburn (1942) estimated that 42% of the known hydroid fauna of South Australia ranged into New South Wales, and 18% into

Western Australia. The present collection (with 1 variety common to N.S.W. and 2 species common to W. Aust.) does not substantially alter these estimates. The basis of comparison between the 3 States is, however, poor, as both the deep and shallow water hydroid fauna of South Australia is now better known from SCUBA collections, whereas much of our knowledge of the hydroid fauna of New South Wales comes from deeper dredgings on the continental shelf, and that of Western Australia is from the reports of shallow water collections between Albany and Shark Bay (Stechow 1924, 1925).

The 18 new records from the present collection, combined with 18 from West I. (Shepherd & Watson 1970) brings the South Australian hydroid fauna, based on Blackburn's list, to 119 species.

Thus, the total number of species common to South Australia and Victoria is 81 (61%) of the known South Australian fauna. This figure does not differ greatly from Blackburn's earlier estimate of 65%.

Based on Hodgson (1950), the fauna common to both South Australia and Tasmania is 69% of the South Australian fauna. The species common to Victoria and Tasmania comprises 70% of the known Tasmanian fauna. This distribution pattern lends further support to the contention of Womersley & Edmunds (1958) that the Flindersian Province embraces much of the Maugean, and extends from the eastern Victorian coastline to at least the central coastline of South Australia.

### Systematic Section

#### Order ATHECATA

#### Family TUBULARIIDAE

*Tubularia larynx* Ellis & Solander, 1786: 31.  
Bale, 1888: 748. Ralph, 1953: 68; 1966: 160.

*Records:* R. 24 m, on walls of cavern, sheltered from surge.

*Material:* One small cluster of stems to 2 cm high. *Stems* increasing gradually in diam. distally to 0.5 cm. Perisarc thick, smooth, with groups of 3–8 annulations; regrowth of broken stems beginning with a new series of annulations. *Hydranth* 1.2 mm long, 1.0 mm wide, but tentacles not fully extended. Proximal whorl of tentacles a little longer than distal. *Gonophores* small, spherical, sex indeterminate, clustered between whorls of tentacles. *Colour*—tentacles white, gonophores pink.

TABLE 1

*List of Species*

Substrate notation: EZ = epizoic, Ep = epiphytic, El = epilithic, Fg = freegrowing, Hf = holdfast fauna.

Symbols are given in order of abundance of colonies on substrate.

\* denotes a new record for South Australia.

The number preceding names of the species in the following list is the key to the species in Tables 2 and 3.

## ATHECATA

## Family TUBULARIIDAE

1. \**Tubularia larynx* Ellis & Solander. El.

## Family SOLANDERIIDAE

2. *Solanderia fusca* (Gray). Hf.

## THECATA

## Family CAMPANULARIIDAE

3. *Clytia* (?) *pearsonensis* n.sp. Ez.  
 4. *Campanularia ambiplica* Mulder & Trebilcock. Ep.  
 5. *Campanularia australis* Stechow. Ep, Ez.  
 6. \**Campanularia gaussica* Stechow. Fz.  
 7. *Campanularia* sp. Ep.

## Family LAFOEIDAE

8. \**Reticularia antarctica* (Hartlaub). Ez.  
 9. *Reticularia annulata* n.sp. Ez.  
 10. *Reticularia* sp. Ez.  
 11. \**Zygophylax antipathes* (Lamarck). Hf.

## Family LINEOLARIIDAE

12. *Lineolaria spinulosa* Hincks. Ep.

## Family HALECIIDAE

13. \**Ophiodissa australis* (Bale). Ep.  
 14. *Ophiodissa blackburni* n.sp. Ez.  
 15. *Phylactotheca armata* Stechow. Ez.  
 16. *Halecium delicatulum* Coughtrey. Ez.  
 17. *Halecium* sp. 1. Ez.  
 18. *Halecium* sp. 2. Ep.

## Family SYNTHECIIDAE

19. *Syntheций elegans* forma *subventricosum* Bale. Ez.  
 20. \**Syntheций dentigerum* Jarvis. Ez.

## Family SERTULARIIDAE

21. *Thyroscyphus marginatus* (Bale). Ep, Ez.  
 22. *Parascyphus simplex* (Lamouroux). Ez.  
 23. *Diphastia subcarinata* (Busk). Ep, Ez.  
 24. *Stereotheca elongata* (Lamouroux). Ep.  
 25. *Crateritheca acanthostoma* (Bale). Ep, Ez.  
 26. \**Crateritheca crenata* (Bale). Ep.  
 27. *Salucia obliquanoda* (Mulder & Trebilcock). Ep, Ez.  
 28. *Sertularella robusta* Coughtrey. Ep, Ez.  
 29. \**Sertularella simplex* (Hutton). Ez.  
 30. *Sertularella annulaventricosa* Mulder & Trebilcock. Ep, Ez.  
 31. *Sertularella avrilia* n.sp. Ep.  
 32. *Sertularella* sp. 1. Ez, Ep.  
 33. *Sertularella* sp. 2. ?  
 34. \**Symplectoscyphus longithecus* (Bale). ?  
 35. *Symplectoscyphus subdichotomus* (Kirchenpauer). Ez.  
 36. *Symplectoscyphus neglectus* (Thompson). Ep.  
 37. *Symplectoscyphus indivisus* (Bale). Ep.  
 38. *Symplectoscyphus pygmaeus* ? (Bale). Ez.  
 39. *Symplectoscyphus macrothecus* (Bale). Ep.  
 40. *Symplectoscyphus rostratus* n.sp. Ep, Ez.  
 41. *Symplectoscyphus epizoicus* n.sp. Ez.  
 42. *Sertularia macrocarpa* Bale. Hf.  
 43. *Sertularia unguiculata* Busk. Ez, Hf.  
 44. \**Sertularia bicuspidata* Lamarck. Ep.  
 45. *Sertularia maccallumi* Bartlett. Ep.  
 46. *Sertularia acuta* Stechow. Ep.  
 47. *Amphisbetia maplestonei* (Bale). Hf.  
 48. *Amphisbetia pulchella* (Thompson). Ep, Ez.  
 49. *Amphisbetia olseni* n.sp. Fz, Ep.

50.	<i>Amphisbetia minima</i> var. <i>pumiloides</i> Bale.	Ep.
51.	<i>Amphisbetia minima</i> var. <i>intermedia</i> Bale.	Ep. Ez.
52.	<i>Amphisbetia minuscula</i> (Bale).	Ep. Ez.
Family PLUMULARIIDAE		
53.	<i>Pycnotheca producta</i> (Bale).	Ep.
54.	* <i>Antennella tubulosa</i> (Bale).	Ep.
55.	* <i>Antennella campanuliformis</i> (Mulder & Trebilcock).	Ep.
56.	* <i>Antennella secundaria</i> s.sp. <i>dubiaformis</i> (Mulder & Trebilcock).	Ep.
57.	<i>Halopteris sulcata</i> (Lamarck).	Fg.
58.	<i>Halopteris campanula</i> var. <i>campanula</i> (Busk).	El.
59.	<i>Halopteris buski</i> (Bale).	Ez.
60.	<i>Halopteris opposita</i> (Mulder & Trebilcock).	Ep.
61.	* <i>Gattya halei</i> (Bartlett).	Ep.
62.	<i>Gattya aglaopheniaformis</i> (Mulder & Trebilcock).	Ez. Ep.
63.	<i>Gattya trebilcocki</i> n.sp.	Ep.
64.	<i>Plumularia procumbens</i> Spencer.	El.
65.	<i>Plumularia asymmetrica</i> Bale.	Fg.
66.	<i>Plumularia flexuosa</i> Bale.	Ep.
67.	<i>Plumularia spinulosa</i> Bale.	Ep. Ez.
68.	* <i>Plumularia goldsteini</i> Bale.	Ep.
69.	<i>Plumularia obliqua</i> (Johnston).	Ep.
70.	<i>Plumularia australis</i> Kirchenpauer.	Ep.
71.	<i>Plumularia epibracteolosa</i> n.sp.	Ep.
72.	<i>Plumularia meretricia</i> n.sp.	Ez.
73.	<i>Plumularia togata</i> n.sp.	Ep.
74.	<i>Plumularia australiensis</i> n.sp.	Ez.
75.	<i>Aglaophenia plumosa</i> Bale.	Ez. Ep.
76.	<i>Thecocarpus divaricatus</i> var. <i>maccoyi</i> Bale.	Ep.
77.	* <i>Thecocarpus divaricatus</i> var. <i>briggsi</i> Bale.	Ep. Ez.
78.	<i>Thecocarpus divaricatus</i> var. <i>cystifera</i> Bale.	El.
79.	* <i>Lytocarpus mulderi</i> (Bartlett).	?
80.	<i>Halicornopsis elegans</i> (Lamarck).	El.
81.	<i>Halicornaria longirostris</i> (Kirchenpauer).	El. Ez. Ep.
82.	* <i>Halicornaria prolifera</i> Bale.	El.
83.	<i>Halicornaria aurea</i> n.sp.	El.

**Remarks:** This cosmopolitan species was doubtfully recorded for the first time from Australian waters by Ralph (1966) who reported a few infertile stems from Port Phillip Bay, Vic. This is the second record of the species in Australia, and a new record for S. Aust.

**Solanderia fusca** (Gray, 1868). Watson & Utinomi, 1971: 19, pl. 8.

*Ceratella fusca* (Gray), Spencer, 1891: 8.

**Records:** R, 14–33 m, among holdfasts of brown algae.

**Material:** Four very small infertile colonies broken off from the rootstock, the largest colony 55 mm high and 20 mm wide. Colonies compact, branching closely in one plane from a thick main stem. *Stem* of largest colony 3 mm wide at base, stem and branches flattened in plane of growth. *Hydrophores* are open shelf-like structures, prominent on younger branches, edged with 10–15 bluntly pointed terminal spines connected by a thick, shallowly scalloped chitinous web. *Trabeculate meshwork* of branches close and solid, with square to circular openings. *Spines* similar to those edging hydrophore developed at points of intersection of meshwork on older branches.

*Hydranths* poorly preserved. **Colour**—stems dark brown, shading to light brown on growing tips.

**Remarks:** The colonies of *S. fusca* from Pearson I., although dwarfed and infertile, are mature, occurring among algae on horizontal rock faces. This is in contrast to the known habitat of larger specimens from Victorian waters, which seem to favour vertical walls and the interior of caverns (J.W., unpublished). Bale (1888, p. 749) mentions that his small colonies from Sydney were from "Laminaria roots" (probably *Ecklonia radiata* holdfasts). Watson & Utinomi (1971) reported that the spinous trabeculae were not present in material examined by them from the Great Australian Bight, yet the Pearson I. specimens show these spines clearly. Unknown environmental and geographical factors may thus influence structural variations within the species.

#### Order THECATA

#### Family CAMPANULARIIDAE

*Clytia* (?) *pearsonensis* n.sp.

FIG. 2

TABLE 2  
Epiphytic Hydroids

The numbers refer to the species as given in the species list.  
VC = very common, C = common, R = rare.

Algal Substrate	Hydroid
<b>CHLOROPHYTA</b>	
<i>Caulerpa brownii</i> (C.Ag.) Endlicher.	63(R)
<i>Caulerpa simpliciuscula</i> (Turner) J. Agardh.	77(R)
<i>Caulerpa</i> sp.	52(VC)
<b>PHAEOPHYTA</b>	
<i>Distromium flabellatum</i> Womersley.	52(VC), 53(R), 56(R)
<i>Distromium</i> sp.	37(C)
<i>Zonaria spiralis</i> J. Agardh.	76(VC)
<i>Scytothalia dorycarpa</i> (Turn.) Greville.	24(VC)
<i>Acrocarpia paniculata</i> (Turn.) Areschoug.	24(VC), 39(R), 50(VC), 76(VC)
<i>Cystophora brownii</i> (Turn.) J. Agardh.	5(C)
<i>Sargassum verruculosum</i> (Mert.) J. Agardh.	31(C), 40(C), 60(R)
<i>Sargassum bracteolosum</i> J. Agardh.	50(VC), 71(VC)
<i>Sargassum spinuligerum</i> Sonder.	37(C), 50(VC), 60(R)
<i>Sargassum varians</i> Sonder.	50(VC), 55(R)
<i>Sargassum</i> sp.	21(R), 30(C), 36(VC), 37(C), 54(R), 69(R)
<b>RHODOPHYTA</b>	
<i>Delisea pulchra</i> (Grev.) Montagne.	68(R)
<i>Pterocladia lucida</i> (R.Br.) J. Agardh.	5(C), 36(VC), 45(VC), 48(R), 55(C)
	61(C)
<i>Rhodopeltis australis</i> Harvey.	44(R)
<i>Metagoniolithon charoides</i> (Lamx.) W. v. Bosse.	27(VC), 36(VC), 73(VC)
<i>Metamastophora flabellata</i> (Sond.) Setchell.	44(R), 51(VC), 61(C), 69(R), 76(VC)
<i>Carpopeltis phyllophora</i> (H. & H.) Schmitz.	45(VC), 75(R)
<i>Callophyllis coccinea</i> Harvey.	62(R)
<i>Plocamium angustum</i> (J. Agardh) Hooker & Harvey.	67(C)
<i>Plocamium carillaginum</i> (L.) Dixon.	76(VC)
<i>Phacelocarpus labillardieri</i> (Mert.) J. Agardh.	24(VC)
<i>Stenocladia australis</i> (Sond.) Silva.	24(VC), 46(VC)
<i>Mychodea</i> sp.	66(R)
<i>Rhodymenia australis</i> Sonder.	51(VC), 56(C)
<i>Ballia callitricha</i> (C.Ag.) Kuetzing.	28(C)
<i>Pterosiphonia</i> ?	61(C)
<i>Anansia pinnatifida</i> Harvey.	23(VC)
<i>Laurencia elata</i> (C.Ag.) Harvey.	32(VC), 37(C), 51(VC), 52(VC), 55(C), 67(C)
Unidentified red algae.	4(R), 7(R), 25(R), 27(VC), 30(C), 36(VC), 40(R), 49(C), 53(R), 77(R), 81(VC)
<b>ANGIOSPERMAE</b>	
<i>Posidonia australis</i> Hook. f.	12(VC), 70(VC)

*Type Material and Records:* Holotype, NMV G1914, microslide—R, 22 m, on stem of *Thecocarpus divaricatus* var. *cystifera*; paratype, G1915, microslide—R, 34 m, on bryozoa.

*Description from holotype and paratype:* Pedicels long, of variable diameter, irregularly wrinkled or smooth (holotype shows indistinct distal annulations), arising from a creeping stolon. *Hydrothecae* large, cylindrical, walls smooth, perisarc very thin and delicate, margin entire, everted into a thin lip. Thecal wall slightly thickened proximally, hydrotheca without floor, tapering into pedicel, a trace of a very thin diaphragm near base. *Hydranth* too poorly preserved for diagnosis. *Gonothea* absent.

*Remarks:* Only 2 undamaged hydrothecae were found in the entire collection, although others, badly damaged, were noted. It is possible that the species has previously been overlooked because of the extremely delicate nature of the perisarc, which collapses immediately on removal from water.

*C. pearsonensis* is closely related to *Laomedea michael-sarsi* Léloup, 1935, reported from only two localities—the West Indies, and the west coast of North Africa. The hydrotheca of *L. michael-sarsi* are, however, shorter and less than half the diameter of *C. pearsonensis*. (Measurements are given for comparison).

Following Millard (1959, p. 248), the species may be referable to either *Campanu-*



TABLE 3

*Epizoic, Epilithic, Freegrowing and Holdfast Associations.*

Substrate	Hydroid
Epizoic Species	
Ascidian—	
<i>Herdmania momus</i> (Savigny)	14(C), 16(C), 19(R), 20(R), 21(R), 22(R), 23(VC), 28(VC), 29(R), 32(VC), 38(C), 43(R), 49(C), 59(R)
Compound ascidians	15(R), 38(C), 75(R)
Sponge	5(C), 9(R), 13(R), 14(C), 15(R), 25(R), 27(C), 28(VC), 38(C), 49(VC), 56(C), 59(R), 74(C), 72(R)
Calcareous bryozoa	3(R), 6(R), 10(R), 14(C), 27(C), 28(VC), 29(R), 30(C), 32(VC), 35(R), 38(C), 40(R), 59(R), 75(R), 81(VC)
Worm tubes	19(R), 59(R)
Other Hydroids—	
<i>Synthecium</i> sp.	16(C)
<i>Thyroscyphus marginatus</i> (Bale)	67(C)
<i>Sertularia unguiculata</i> Busk.	20(R), 56(C)
<i>Symplectoscyphus subdichotomus</i> (Kirchenpauer).	77(R)
<i>Halopteris campanula</i> var. <i>campanula</i> (Busk).	32(C)
<i>Plumularia prociumbens</i> Spencer.	16(C), 62(C)
<i>Thecæcarpus divaricatus</i> var. <i>cystifera</i> Bale.	3(R), 8(VC), 19(R), 22(R), 29(R), 38(C), 41(C)
<i>Halicornaria longirostris</i> (Kirchenpauer).	8(VC), 17(R), 41(C), 52(VC)
Epilithic Species	1(R), 58(R), 64(C), 78(C), 80(R), 81(VC), 82(R), 83(C)
Freegrowing Species	57(C), 65(VC)
Holdfast Species	2(C), 11(R), 42(C), 43(C), 47(C)

Dimension, mm	<i>C. pearsonensis</i>		<i>L. michael-sarsi</i>	
	holo type	para type	N. Africa	W. Indies
Stem length	1.80	1.32	—	1.00-1.50
diam.	0.07	0.17	—	0.10-0.15
Hydrothecæ—				
width at margin	0.59	0.68	0.25	0.25-0.30
depth to diaphragm	0.78	0.69	0.63	0.40-0.50

*laria* or *Clytia*. The barely discernible diaphragm and very delicate thecal wall suggest it may belong to the latter genus, but its systematic position is indeterminate until fertile material is found.

***Campanularia ambiplica*** Mulder & Trebilcock, 1914: 11, figs. 2-4. Shepherd & Watson, 1970: 140.

*Paracelix ambiplica* (M. & T.). Stechow, 1925: 209, fig. E.

*Records*: S, 5-14 m, on red algae.

*Material*: Three infertile stems. *Stems* short, spirally annulated. *Hydrothecæ* long, narrow, walls parallel, a very strong S-shaped fold about halfway along thecal wall. *Margin* with 6 teeth, each with several reduplications.

*Remarks*: Type material of *C. ambiplica* in the collection of the NMV shows more campanulate hydrothecæ with blunter and less deeply excavated marginal teeth than the Pearson I.

specimens. Stechow's figures of specimens from Champion Bay, W. Aust. are intermediate in length between the two. Measurements are given for comparison.

Dimensions, mm	Pearson I.	Champion Bay	Victoria (M. & T.)
Stem diam.	0.06	0.06	0.06
Hydrothecæ—			
length	0.52	0.42	0.34
width	0.17	0.18	0.17

***Campanularia australis*** Stechow, 1924: 61. Shepherd & Watson, 1970: 140.

*Orthopyxis australis* (Stechow). Hirohito, 1969: 10, fig. 9.

*Records*: R, 34 m, on the algae *Pterocladia lucida*, *Cystophora brownii*, and sponge.

*Material*: *Stems* variable, to 3 mm long, longer stems smooth, short stems annulated. *Hydrothecæ* compressed, with a wide submarginal flange and 9-10 bluntly pointed teeth, in one instance showing reduplication. *Hydranth* with 16-20 tentacles. Colonies fertile.

*Remarks*: Although widely distributed at all depths and on a variety of substrates, the colonies were not luxuriant.

*Campanularia gaussica* Stechow, 1923: 102; 1924: 62.

FIG. 3

*Record:* S. 24 m, on calcareous bryozoa.

*Material:* Three infertile stems. *Stems* to 4 mm long, showing joints where breaks have regenerated. A spherule between stem and hydrotheca. *Hydrothecae* large, campanulate, 1.26–1.32 mm deep, expanding evenly from a narrow base to margin, an annular diaphragm in thecal cavity. Margin variable in diam., 0.78–1.2 mm, with 12 deep tongue-shaped teeth 0.015–0.018 mm wide at base, 0.013–0.015 mm long, the sinus between of same shape and size as tooth. *Hydranth* with approx. 16 tentacles surrounding a thick annular hypostome, similar to that of *Eudendrium*.

*Remarks:* The Pearson I. specimens are among the largest specimens of *Campanularia* recorded from Australian waters, the only other specimen of comparable size being "*Campanularia tinctoria* var. d" of Mulder & Trebilcock (1914a) from Bream Creek, Vic. (see discussion below). This is a new record for S. Aust.

*Remarks on the status of C. tinctoria Hincks, 1867, C. gaussica, and C. australis.*

Stechow (1925, p. 206) placed Mulder & Trebilcock's vars. "a", "b", "c" and "d" of *C. tinctoria* in tentative synonymy with *C. gaussica*. However, the dimensions of the hydrothecae calculated from Mulder & Trebilcock's figures are somewhat greater than those given by Stechow for his specimens. Moreover, his figure does not show the annular diaphragm figured by Mulder & Trebilcock, a feature also present in the Pearson I. specimens.

Earlier, Stechow (1924) stated that the gonosome of *C. gaussica* was unknown, yet included in his synonymy (1923, p. 102) a questionable reference to the *C. tinctoria* of Bale (1884, p. 57) from Portland, Victoria, for which the gonotheca was figured. He later referred Bale's species to *C. longitheca* without explanation. The Portland specimen in the collection of the NMV is undoubtedly *C. australis*; not *C. gaussica*.

I cannot agree with Rees & Thursfield (1965, p. 94) who referred *C. gaussica* to the synonymy of *C. tinctoria*. The latter is a very small and distinctive species; although they stated they had examined the type material of *C. tinctoria*, they failed to note the very considerable difference in size between the two.

The definition of the four species, *C. tinctoria*, *C. australis*, *C. gaussica* and *C. africana*, from

Australian waters is thus somewhat confused. Although *C. tinctoria* and *C. australis* are very similar, with bilaterally symmetrical hydrothecae, *C. australis* is considerably the larger of the two. *C. australis* shows a wide choice of substrate, being both epizoic and epiphytic, whereas *C. tinctoria* appears to be most frequently associated with the seagrass *Amphibolis antarctica* (J.W., unpublished).

Hirohito (1969, p. 10) transferred *C. australis* to *Orthopyxis* on the basis of the bilateral symmetry of the hydrotheca, but the true generic status of *C. australis* will remain indeterminate until the gonosome is found.

*C. africana* is a distinct species, and has been redescribed by Millard (1966, p. 474). The hydrotheca is of medium size and the gonosome is known. This species has been recorded from Queensland (Pennycuik 1959, p. 169), from "rock pools and weed".

Until the collection of fertile material establishes the validity of *C. australis* and *C. gaussica*, those forms from Australian waters with very large campanulate hydrothecae and 10–14 tongue-shaped teeth are recognized as *C. gaussica*; those with large parallel-walled hydrothecae and bilateral symmetry are recognized as *C. australis*, and those similar to *C. australis* but much smaller in size, as *C. tinctoria*. In the case of *C. gaussica*, it is possible that more than one species may actually be involved.

*Campanularia* sp.

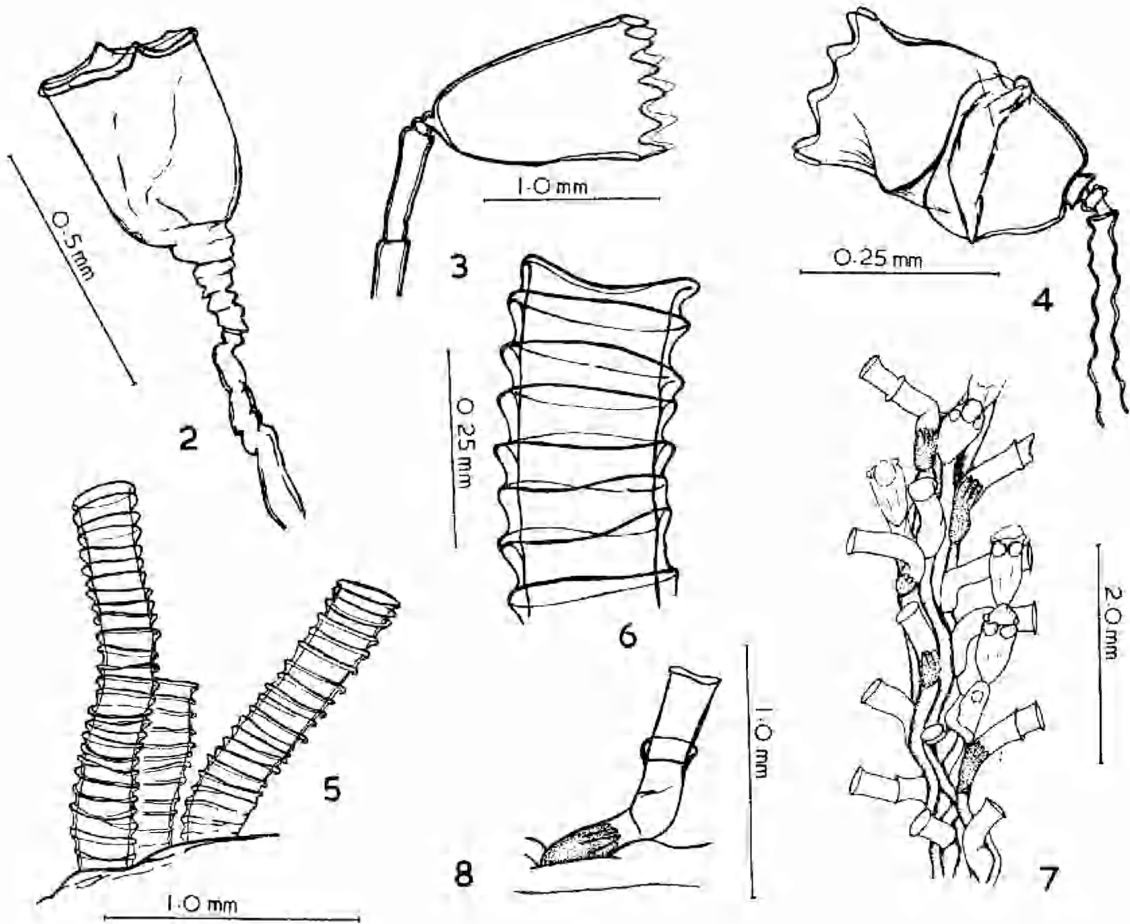
FIG. 4

*Records:* S, 17–20 m, on red algae.

*Material:* Three infertile stems. *Stems* 0.51–0.72 mm long, spirally annulated, annulations sometimes indistinct; maximum width of stem, 0.04 mm. *Hydrothecae* campanulate, length 0.39 mm, widest about one third distance up from base, this point being marked by a crumpled fold encircling thecal wall. Base of hydrotheca flat, with a slight concavity, a socket and spherule between hydrotheca and stem. *Margin* 0.22 mm in diam., with 8 broad tongue-shaped teeth 0.025 mm high; width between teeth, 0.06 mm.

*Remarks:* The hydrothecae are very delicate. Although the hydrothecae are somewhat collapsed in mounting, the fold around the proximal region of the thecal wall is clear in all specimens.

The specimens are undoubtedly referable to the *C. ambiplica*-*C. pulchra* group endemic to southern Australian waters, most resembling the latter species. However, *C.*



- Fig. 2. *Clytia* (?) *pearsonensis* n.sp. Hydrotheca, from holotype.  
 Fig. 3. *Campanularia gaussica* Stechow. Hydrotheca; stem with regenerated pedicel.  
 Fig. 4. *Campanularia* sp. Hydrotheca.  
 Figs. 5, 6. *Reticularia annulata* n.sp. Fig. 5.—Group of three hydrothecae Fig. 6.—Distal end of hydrotheca, enlarged. Drawn from holotype.  
 Figs. 7, 8. *Reticularia* sp. Fig. 7.—Part of colony, showing growth habit on bryozoan colony. Fig. 8.—Hydrotheca, enlarged, showing regenerated distal end.

*pulchratheca* has 14 sharply pointed teeth, the intrathecal fold is in the distal region, and does not encircle the thecal wall as in the present material. This may be a new species, but the material is inadequate for determination.

#### Family LAFOEIDAE

***Reticularia antarctica*** (Hartlaub, 1904). Totton, 1930: 160, fig. 17. Briggs, 1938: 26.  
*Lafoea antarctica* Hartlaub, 1904: 11, pl. 2, fig. 2.  
*Filellum antarcticum* (Hartlaub). Stechow, 1925: 214.

**Records:** R, 18–33 m, on stem of *Thecocarpaceus divaricatus* var. *cystiferus*. S, 14 m, on stem of *Halicornaria longirostris*.

**Material:** Luxuriant infertile colonies. *Hydrothecae* delicate, of variable length, arising at various angles from hydrorhiza so thickly that it is difficult to determine the length of the adnate part, but it is usually not more than one quarter of the total length of the hydrotheca. *Margin* slightly everted, often with 2–3 reduplications; occasionally an earlier reduplication about halfway along hydrotheca coincides with a slight flexure of the thecal wall. Length of free part of hydrotheca, including reduplications, 1.0–1.18 mm; diam. at margin, 0.21 mm.

**Remarks:** It is very difficult to distinguish between *R. antarctica* and *R. serpens* in the

absence of coppiniae, and as the diameter of the thecal margin is greater than those measurements given by Stechow (1925, p. 214) for *R. serpens* (after Millard 1958, p. 175), the Pearson 1. specimens are referred to *R. antarctica*.

This is the first record of *R. antarctica* from S. Aust. waters. (Other locality—W. Aust.)

***Reticularia annulata* n.sp.**

FIGS. 5, 6

*Type Material and Records:* Holotype NMV G1922, microslide; G2091, preserved material, remainder of holotype colony—S. 17 m, on a small calcareous bryozoa.

*Description from holotype:* Hydrothecae long, tubular, increasing slightly in diameter distally, adnate for a small part of length, free part 0.15–0.18 mm, curving out from hydrorhiza. Hydrothecae ringed throughout entire length with closely and evenly spaced annular ribs, average distance between ribs 0.05 mm, each rib with sharply everted rim; annulations on adcauline wall not as sharply defined as those on free wall. Margin circular, entire, same diam. as hydrotheca, 0.19–0.26 mm, occasionally sinuously curved, with everted rim. Gonotheca absent.

*Remarks:* *R. annulata* is closely related to both *R. antarctica* (Hartlaub, 1904) and *R. serpens* (Hassall, 1848) in shape and dimensions of the hydrotheca, but it is easily distinguished from these species by the close thecal rings. *R. serrata* (Clarke, 1879) is annulated, but the annulations are confined to the adnate part of the hydrotheca, and it is a much smaller species.

The rings in *R. annulata* are of uniform size, and the distance between them varies little along the entire length of the hydrotheca. They have developed by continuous apical reduplication during growth of the hydrotheca, the flange of each rib being a relict margin.

***Reticularia* sp.**

FIGS. 7, 8

*Records:* R. 18 m, colony investing stalk of calcareous bryozoa.

*Material:* One infertile colony. Hydrothecae arising in groups, or singly at irregular intervals. Hydrothecae from the outer hydrorhizal tubes adnate for approximately half their length, free part standing out almost perpendicular to hydrorhiza. Length of free part 0.45–0.66 mm, only the orifice of those hydrothecae more deeply embedded in the stolon complex visible. Hydrothecae tubular, 0.2 mm in diam.,

many with 2–3 regenerations after breakage, some with marginal reduplication. Colour—brown.

*Remarks:* The general appearance of the hydrothecae and the diameter of the margin are very similar to *R. antarctica* from Pearson 1., but the hydrothecae of the present specimens are much shorter; the thick woody fascicled hydrorhizal tubes further distinguish the present material.

The twiggy appearance of the colony, imparted by the shape of the host, strongly suggests the growth habit of *Cryptolaria*, but without the regularity of arrangement of the hydrothecae of that genus.

This may prove to be a new species.

***Zygophylax antipathes* (Lamarck, 1816). Rees & Thursfield, 1965: 76.**

*Sertularia antipathes* Lamarck, 1816: 115.

*Campanularia rufa* Bale, 1884: 54, pl. 1, fig. 1.  
*Lictorella antipathes* (Lamarck): Ritchie, 1911: 821.

*Zygophylax rufa* Bale, 1914c: 90.

FIG. 9

*Records:* R. 18–45 m, among holdfasts of brown algae on vertical walls and on the seafloor.

*Material:* Three infertile colonies, the largest 12 cm high, growing from a small rootstock. Stems woody, very brittle, main stem fascicled (2 mm thick in largest colony) the fasciculations decreasing distally along the branches. Branches given off randomly around main stem, some of younger branches monosiphonic. Hydrothecae alternate, 0.32–0.34 mm deep (margin to diaphragm) arising from an apophysis at 45° to stem, frequently a short segment (a broken and regenerated pedicel of an earlier hydrotheca) between hydrothecal pedicel and apophysis. Adcauline thecal wall convex, 0.30–0.37 mm long, usually smooth, sometimes a little undulated; abcauline wall straight or slightly concave, 0.30–0.36 mm long. Margin usually with a distinctly everted rim 0.17 mm in diam., occasionally with 1 reduplication. Diaphragm near base of hydrotheca transverse, occasionally oblique. Nematothecae rare, only 2 seen in mounted specimens, one given off from a hydrothecal apophysis, the other from a polysiphonic tube of the stem. Colour—deep reddish brown.

*Remarks:* The branches are overgrown with algae and compound ascidian.

Bale (1914c) maintained the distinction between *Z. rufa* and *Z. antipathes* on the following criteria:



- (i) the smaller colonies of *Z. rufa*, the lack of rigidity of the branches, and,
- (ii) *L. antipathes*, following Billard, shows no distal narrowing of the hydrotheca, nor an everted margin.

Examination of a series of microslides of *Z. rufa* in the collection of the NMV, show Bale's material to have come from either a broken branch, or the distal end of a very young colony, and there are few hydrothecae which are not noticeably narrowed distally; some also lack an everted margin. One branch of the Pearson I. material has a series of hydrothecae with almost straight walls, no eversion of the margin, and a rather more delicate perisarc than usual.

Regenerated hydrothecal pedicels with an additional segment are common in the older regions of the stems, but are not present in the younger branches. They are a character developed with aging of the stem, and are thus not specifically diagnostic.

I have compared microslides of Ritchie's "Thetis" material of *Lictorella antipathes* with *Z. rufa* of Bale, and find them to be identical in all respects, except that the perisarc of *Z. rufa* is much more delicate than that of the "Thetis" specimens.

Ritchie did not comment on the presence of nematothecae (similar to those on the Pearson I. specimens) visible in his slides. These were apparently noted by Rees & Thursfield (1965) who transferred the species to *Zygophylax* without comment.

Since the present material has features which clearly bridge the gap between *Z. rufa* and *Z. antipathes*, the two are considered synonymous.

This is the first record of *Z. antipathes* in S. Aust. waters. (Other localities—Torres Strait, and off Port Jackson, N.S.W.)

#### Family LINEOLARIIDAE

*Lineolaria spinulosa* Hincks, 1861: 280, pl. 8.  
Shepherd & Watson, 1970: 140.

*Record:* S, 15 m, on the seagrass *Posidonia australis*.

*Material:* Numerous infertile colonies overrunning the blades of the seagrass.

*Remarks:* *L. spinulosa* was not found on any other substrate at Pearson I.

#### Family HALECUIDAE

*Ophiodissa australis* (Bale, 1919).

*Ophiodessa australis* Bale, 1919: 336, pl. 16, fig. 1.

*Record:* R, 19 m, on black sponge.

*Material:* One colony of several infertile stems growing from a matted hydrorhiza on the surface of the sponge. Stems to 2 cm long, fascicled, irregularly branched, with 2-3 supplementary tubes extending two thirds the distance up stem. *Hydrophore* with a few reduplications. *Nematothecae* rare. *Colour*—light greenish, with black patches scattered throughout hydrocaulus. (Under the microscope these patches are black granules concentrated on the hydranth and in the coenosarc.)

*Remarks:* The status of *Ophiodissa* has been briefly discussed by Watson (1969, p. 111). Bale (1919) described, but did not figure the gonophore of *O. australis*. Ralph (1958, p. 342) was uncertain whether *O. australis* is a synonym of *Hydrodendron caciniiformis* (Ritchie, 1907) but kept the two species separate because "the hydrothecae of *A. australis* Bale are shallower, measured from the margin to puncta line, than those of *H. caciniiformis*, and the gonothecae of the latter are unknown". Millard (1966b, p. 490) described the gonophore of *H. caciniiformis* from material from the Vema Seamount, off the west coast of South Africa.

There are two microslides of *O. australis* in the Bale collection in NMV, one from Green Point, N.S.W., and the other from Port Phillip Heads, Vic. The latter specimen is a lightly fascicled stem 2 cm long, with a group of 10 male gonophores growing from the hydrhiza, and is undoubtedly the slide from which Bale described the gonotheca of the species.

The gonothecae are smooth or very slightly annulated, with curved or straight pedicels, and several have a slight constriction just below the truncated distal end. The gonophores are nearly mature, the blastostyle almost filling the gonothecal cavity, and above the blastostyle there is a ring of black granules.

The gonothecae and gonophores of Bale's material are similar to those of *H. caciniiformis* figured by Millard, but the gonotheca of *O. australis* is much longer and more than twice the width of those of *H. caciniiformis*. Furthermore, the hydrophore of *H. caciniiformis* (from Millard's figure) is both wider and deeper than that of *O. australis* from Green Point. It seems that the two species, while very similar, are distinct.

Comparison of measurements (see below) of *H. caciniiformis* from New Zealand with Bale's *O. australis* shows that the New Zealand material falls near the dimensional range of *O. australis*, and may well be this species.

The finding of fertile material in New Zealand waters will settle this point.

Dimensions, mm	<i>O. australis</i>		<i>H. sacculiformis</i>	
	Pearson I.	Green Pt.	N. Zealand	S. Africa
Hydrophore—				
diam. at puncta line	0.14	0.15	0.12	0.20
depth, margin to puncta line	0.025	0.035	0.04-0.06	0.10
Gonotheca—				
length	—	1.44-1.50	—	0.90-1.20
width at aperture	—	0.94-1.00	—	0.40

The specimens from Pearson I. are identical in every respect with Bale's *O. australis*. This is the first record of *O. australis* from S. Aust.

#### *Ophiodissa blackburni* n.sp.

FIGS. 10-12

**Type Material and Records:** Holotype, NMV G1927, microslide; G2092, preserved material, remainder of holotype colony—S, 27 m, on *Herdmania monax*; Paratypes G1928, G1929, microslides; G2093, preserved material, remainder of paratype colony—S, 24-27 m, on bryozoa and sponge.

**Description from holotype and paratypes:** Hydromorpha a winding tubular stolon 0.11-0.13 mm in diam., thick and strongly corrugated throughout entire length, becoming erect at intervals to form monosiphonic stems to 12 mm high. *Hydrophores* given off irregularly, either directly from the stolon or from stem. Pedicel of hydrophores of variable length, 0.19-0.27 mm, beginning with an annular constriction 0.07-0.10 mm in diam., followed by 1-2 annulations, then expanding evenly to margin. Perisarc thin. *Secondary* and tertiary hydrophores common, branching outwards just below the diaphragm of primary (or secondary) hydrophore, becoming ascending at annular constriction. Hydrophores reduplicated up to 4 times; reduplications of variable length, given off successively from the diaphragm of preceding hydrophore. *Diaphragm* 0.13-0.17 mm in diam., moderately deep, 0.04 mm from margin (best seen in preserved material). *Margin* flaring, with strongly everted lip, diam. 0.22-0.24 mm. *Nematothecae* sparse low tubular orifices 0.03 mm high, and 0.05 mm in diam. at base, situated on hydromorpha or stem, opposite, or nearly opposite hydrothecal pedicel. *Hydranth* large, extensile, with approx. 30 stubby tentacles. *Colour*—yellow. *Gonotheca*—absent.

**Remarks:** The presence of nematothecae places the present material in *Ophiodissa* (Watson

1969, p. 111). Although in some instances the nematothecae may be mistaken for the broken base of a hydrothecal pedicel, their position opposite the pedicel, and their smaller size usually serves to distinguish them.

*O. blackburni* shows some resemblance to *O. corrugata* Fraser, 1936. However, neither branching nor reduplication of the margin is mentioned or figured by Fraser, and the tentacular organs of *O. corrugata* are described as being relatively large and flaring slightly at the margin (Fraser 1936, p. 113).

Blackburn (1938, p. 322) described a fragmentary *Halecium* sp. from the littoral zone of Reevesby I. in the Sir Joseph Banks Group, S. Aust., remarking that the material, too obscured by foreign matter for diagnosis, was probably a new species, similar to *H. corrugatum* Nutting, 1912. Although Blackburn's specimens are not available for comparison, it is certain that his material and the present specimens are the same species.

**Phylactotheca armata** Stechow, 1924: 59; 1925: 204, fig. C. Blackburn, 1942: 106.

*Ophiodissa fragilis* Blackburn, 1937a: 365, fig. 1.

**Records:** R, 33 m, on sponge and ascidian.

**Material:** A few infertile stems to 1 cm high.

**Remarks:** The Pearson I. material conforms to the description of the species given by Stechow and Blackburn.

There are no secondary hydrophores, nor any nematothecae developed in the present material. Blackburn's specimens from Balnarring, Vic., similarly showed no sign of nematothecae. Hence their presence or absence cannot be taken as a good diagnostic character for the genus.

**Halecium delicatulum** Coughtrey, 1876: 299.

Ralph, 1958: 334, figs. 11, 12. (synonymy).

**Records:** R, 21-45 m, on *Plumularia procumbens* and *Synthecium* sp.; S, 24 m, on *Herdmania monax*, and bryozoa.

**Material:** Many small infertile stems to 2 cm high. *Stems* irregularly and sparsely branched; a few are lightly fascicled, with an extra polysiphonic tube running up the proximal part of the stem.

**Remarks:** One of the most abundant epizoid species in the collection.

*Halecium* sp. 1.

## FIG. 13

Record: R, 30 m, on lower stem of *Halicornaria longirostris*.

**Material:** A single infertile stem 1.2 mm high. Stem unfasciated, irregularly branched; stem and branch internodes of variable length, up to 0.22 mm, and 0.04 mm in diam., annulated proximally, but otherwise fairly smooth. Branches given off from distal end of internodes on lower part of stem. Pedicel of primary hydrophore of variable length, proximal node transverse, followed by 1-2 annulations, the remainder smooth, expanding evenly to diaphragm. Hydrophore small, shallow, with circular margin, 0.08-0.12 mm in diam., and strongly everted rim; up to 3 reduplications given off successively from mouth of preceding hydrophore. Diaphragm present, depth from margin to diaphragm, 0.02-0.03 mm. Secondary and tertiary branches common, arising from distal end of pedicel of primary (or secondary) hydrophore.

**Remarks:** This very small form resembles *H. tenellum* Hincks, 1861 in size and delicacy of the trophosome, but the dimensions are even smaller than those given by Millard (1957, p. 193) and Ralph (1958, p. 340) for this species.

In the present material, only the first internode can be described as a true stem, the branching being truly arborescent, all subsequent internodes being secondary branches given off the pedicels of the primary hydrophores. The presence or absence of punctae cannot be ascertained because of foreign matter. However, the Bale collection in the NMV contains a microslide labelled "*Halecium*, Griffiths Point, July, 1880" with one small infertile stem identical with the Pearson I, specimen, and the hydrophores of this stem show a very clear ring of punctae between the margin and diaphragm.

This is probably a new species, but due to its similarity to *H. tenellum* its identity is indeterminate until adequate fertile material is found.

*Halecium* sp. 2.

## FIG. 14

Record: R, 35 m, on algae.

**Material:** Two very small infertile stems. *Hydrorhiza* tubular. Stems unbranched, 2 mm long, internodes of variable length, 0.28-0.66 mm; diam. 0.08-0.12 mm, perisarc thick, divided into segments by 2-3 deep, transverse

constrictions, the last segment expanding slightly to support base of hydrophore. Hydrophore very shallow, depth to diaphragm 0.03 mm. Margin circular, 0.14-0.17 mm in diam., slightly everted. Succeeding stem internodes arising just below hydrophore, standing out perpendicularly, giving stem a zig zag appearance. *Hydranth* too large to retract into hydrophore, body thick, about 24 stubby tentacles.

**Remarks:** All the hydrothecal margins are so damaged that it is impossible to determine if punctae are present. Although the dimensions fall well within the range of *H. lankesteri* (Bourne, 1890) (Millard 1968, p. 257) the internodes show no tendency to curve upward, nor is there any sign of the secondary hydrophores common in this species. For these reasons, the present specimens are not assigned to *H. lankesteri*.

## Family SYNTHECIIIDAE

*Synthecium elegans* forma *subventricosum*

Bale, 1914, Ralph, 1958: 347, fig. 16.

## FIGS. 15, 16

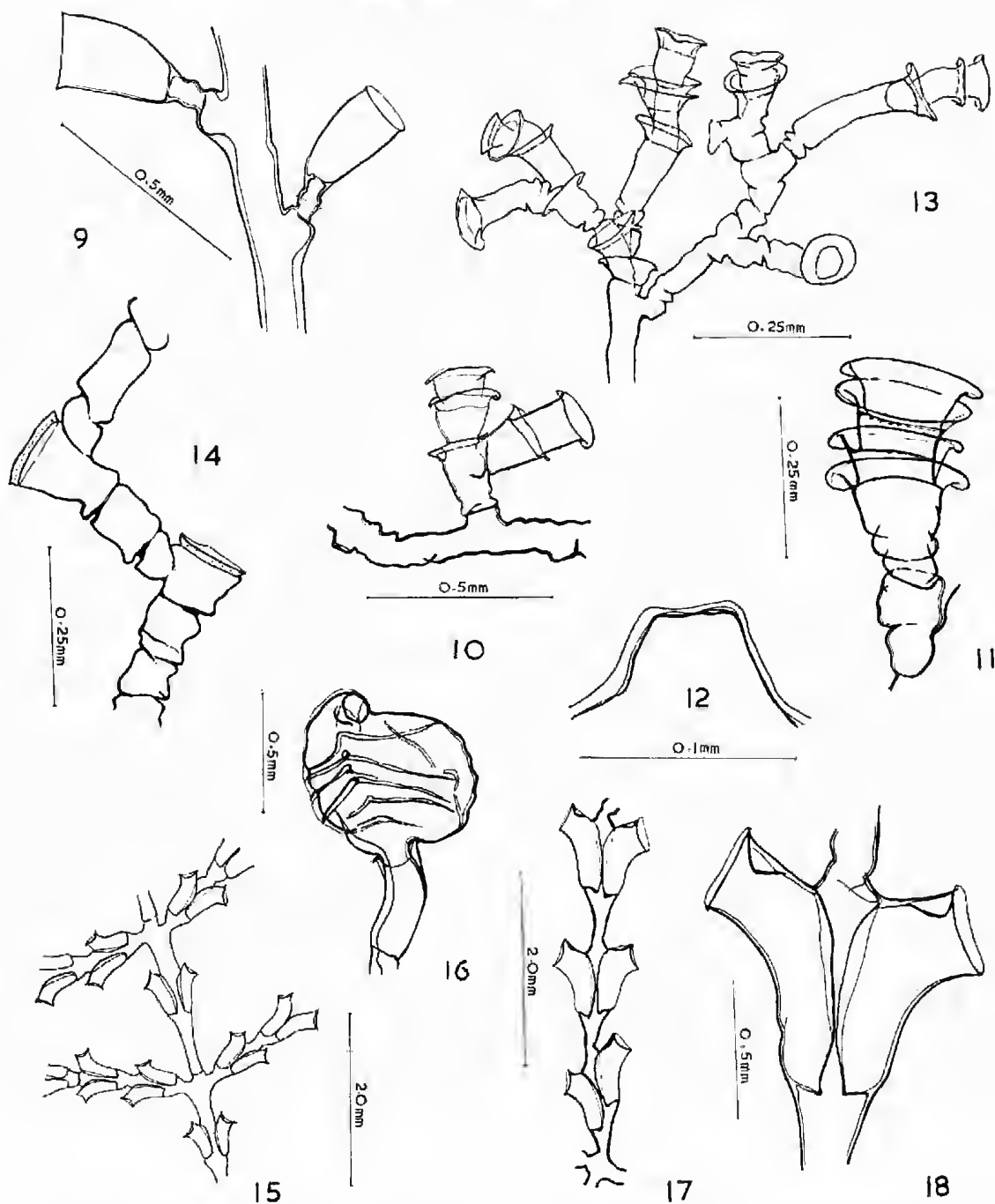
*Synthecium elegans* Allman, 1872: 229. Blackburn, 1942: 111.

*Synthecium subventricosum* Bale, 1914a: 5, pl. 1, figs. 3-5; 1915: 265.

**Records:** R, 34 m, on *Herdmania momus*; S, 18-25 m, on stem of *Thecocarpus divaricatus* var. *cystifera*; Stn. F, 65 m, on worm tubes with *Diphasia subcarinata*.

**Material:** Several immature colonies; one fertile stem. Stems monosiphonic, flexuous, to 2 cm long; no secondary branching, but a few tendrils given off distal ends of branches. Proximal stem internodes with 1-3 pairs of opposite hydrothecae; succeeding internodes 1.5-1.8 mm long, a pair of opposite hydrothecae in middle of internode, and a pair of opposite, distally situated hydrocladia. Hydrothecae of variable shape, generally tubular, three quarters of length adnate to internode, free adcauline wall 0.07-0.15 mm long, fixed wall 0.42-0.45 mm; abcauline wall 0.38-0.44 mm long. A delicate internal sheath clearly visible in many hydrothecae. Margin of hydrotheca sinuous, slightly everted, 0.18-0.19 mm in diam., a few marginal reduplications. Gonotheca—a single immature individual growing from the orifice of one of the second pair of hydrothecae on basal stem internode. Colour—white, with trace of purple.

**Remarks:** The single immature gonotheca identifies the Pearson I, material with *S. subventricosum* Bale, recognised by Ralph (1958) as a varietal form of *S. elegans* Allman.



- Fig. 9. *Zygophylax antipathes* (Lamarck). Portion of branch showing hydrothecae with everted margins and regenerated hydrothecal pedicels.
- Figs. 10-12. *Ophiodissa blackburni* n.sp. From holotype. Fig. 10.—Hydrorrhiza and stem with secondary hydrophores and reduplicated margins. Fig. 11.—Reduplicated hydrophores, enlarged. Fig. 12.—Nematothecae, enlarged.
- Fig. 13. *Halecium* sp. 1. Whole stem, showing growth habit.
- Fig. 14. *Halecium* sp. 2. Part of stem showing hydrophores and growth habit.
- Figs. 15, 16. *Syntheicum elegans* forma *subventricosum* Bale. Fig. 15.—Part of stem. Fig. 16.—Immature gonotheca.
- Figs. 17, 18. *Syntheicum dentigerum* Jarvis. Fig. 17.—Part of branch with subopposite to opposite hydrothecae. Fig. 18.—Hydrothecae enlarged, showing internal adcauline teeth.



Although there is considerable variation in shape of the hydrothecae among the specimens, most are tubular and closely adnate to the hydrocladium, not ventricose, as described by Bale for his specimens from the Great Australian Bight. Moreover, there is only one pair of opposite hydrothecae in the middle of each of the distal stem internodes, and a pair of opposite, distal hydrocladia, and the hydrothecal margins are decidedly sinuated, all features considered by Bale to be criteria distinguishing *S. parvum* Busk.

Thus, *S. elegans* forma *subventricosum* may eventually prove to be a synonym of *S. patulum*. However, in view of the lack of adequate fertile material, the fact that the type of *S. patulum* is not known to exist, and the possibility that sexual dimorphism may occur, it is best to keep the species separate at present.

*Synthecium dentigerum* Jarvis, 1922: 344, pl. 25, fig. 15. Totton, 1930: 172. Millard, 1964: 24, fig. 6.

FIGS. 17, 18

*Records:* S, 23 m, on stem of *Sertularia unguiculata* and *Herdmania momus*.

*Material:* Five infertile stems, to 2 cm long. *Stems* monosiphonic, basal internodes long, 3.0–3.6 mm, with 5 pairs of opposite hydrothecae; each succeeding internode with 2–3 pairs of hydrothecae in mid region, followed by a pair of opposite hydrocladia. *Hydrocladia* arising perpendicular to stem from a distinct proximal joint; anastomoses, and some secondary branching occur. *Hydrothecae* almost tubular, adnate for two thirds their length, fixed adcauline wall 0.45–0.51 mm long, free wall 0.15–1.2 mm; abcauline wall 0.36–0.42 mm. *Margin* narrow, sinuated, with slightly everted rim, 0.21–0.27 mm in diam. Proximal hydrocladial hydrothecae subalternate, becoming opposite distally. (One stem has alternate hydrothecae with the abcauline wall bent sharply outwards.) Adcauline submarginal tooth present in most hydrothecae, variable from wedge-shaped to a mere thickening of the adcauline wall. No abcauline teeth or marginal reduplications.

*Remarks:* Three species of *Synthecium* with internal teeth have been described, *S. carinatum* Totton, 1930, *S. singulare* Billard, 1935, and *S. dentigerum* Jarvis, 1922. The Pearson I. specimens are larger than *S. carinatum* and smaller than *S. singulare*, but fall well within the range given by Millard (1964) for *S. dentigerum*. The specimens are distinguishable from *S. ele-*

*gans* forma *subventricosum* Bale, from Pearson I., only by the presence of the internal submarginal tooth, which is however not developed at all in some hydrothecae, the most prominent teeth being associated with those hydrothecae which have a flexure of the abcauline wall. Although the present material differs in some respects from descriptions of *S. dentigerum* in size of the colonies and arrangement of the stem hydrothecae, these are neither sufficiently constant nor important characters to warrant the erection of a new species.

This is the first record of *S. dentigerum* from Australian waters. It has been reported twice previously, from the Indian Ocean and South Africa.

#### Family SERTULARIIDAE

*Thyroscyphus marginatus* (Bale, 1884). Bale, 1915: 245. Stechow, 1925: 217. Blackburn, 1942: 112.

*Campanularia marginata* Bale, 1884: 154, pl. 1, fig. 2; 1888: 758; 1914: 91. Bartlett, 1907: 62.

*Records:* R, 14–30 m on algae and sponge; S, 22–30 m on *Sargassum* variants.

*Material:* Four infertile colonies of a few stems each. *Hydrorhiza* a simple tube, loosely wound on substrate. *Stems* simple, to 1 cm long, smooth or slightly annulated, diam. increasing distally, a distinct transverse joint just above junction with hydrorhiza. *Pedicles* of hydrothecae 1.95–2.7 mm long, 0.25 mm in diam. distally. In one stem, 2 branches are given off side by side, 1 short, terminating in a hydrotheca, the other continuing normal growth, giving off a pedicel distally. *Hydrothecal margin* with 4 teeth, 4 valved operculum, and thickened submarginal ring. Depth of hydrotheca, 1.5 mm; diam. at margin, 0.75–1.21 mm.

*Remarks:* This agrees fairly well with descriptions of *T. marginatus* given by Bale.

*Parascyphus simplex* (Lamouroux, 1816). Blackburn, 1942: 112. Ralph, 1961a: 755, fig. 1. Stechow, 1925: 224.

*Laomedea simplex* Lamouroux, 1816: 206.

*Campanularia simplex* (Lamouroux). Bale, 1884: 58.

*Campanularia raridentata* Bale, 1894: 98, pl. 3, fig. 3.

*Thyroscyphus simplex* (Lamouroux), Hodgson, 1950: 10, fig. 22.

*Records:* R, 34 m, on sponge and *Herdmania momus* on vertical walls; S, 25 m, on *Thecocarpus divaricatus*.

*Material:* A few infertile colonies. *Stems* short, unbranched, to 5 mm long. *Hydrothecae*

swollen on proximal adcauline wall; some with a short pedicel. Stem apophyses pronounced, many with a constriction marking the site of growth regeneration after breakage.

**Remarks:** The stem apophyses figured by Hodgson (1950) and Ralph (1961) appear to merge into the base of the hydrothecae. Bale's (1894) figure shows a more pronounced apophysis, similar to those of the Pearson I. specimens.

**Diphasia subcarinata** (Busk, 1852). Bale, 1884: 102, pl. 4, fig. 1, pl. 19, fig. 18; 1914a: 7; 1915: 264. Ritchie, 1911: 850. Hodgson, 1950: 20, figs. 34, 35. Ralph, 1961a: 764, fig. 5. Shepherd & Watson, 1970: 140.

*Sertularia subcarinata* Busk, 1852: 390.

**Records:** R, 20–34 m on bryozoa; S, 25 m on *Amansia pinnatifida* and *Herdmania momus*; Str. F, 65 m, on worm tube.

**Material:** Many infertile unbranched colonies 0.5–1 cm high. **Colour**—dark brown.

**Remarks:** The keel described by Bale (1884) in his Victorian material is present in the Pearson I. specimens only as an indistinct ridge passing between the lateral marginal tooth and the adcauline thecal wall. Ralph (1961) notes the presence of the ridge as a "prominent feature" on her New Zealand specimens, but Hodgson (1950) was unable to find the ridge in his Tasmanian material.

**Stereotheca elongata** (Lamouroux, 1816). Hodgson, 1950: 23, figs. 38, 39. Ralph, 1961: 762, fig. 4. Shepherd & Watson, 1970: 140.

*Sertularia elongata* Lamouroux, 1816: 189, pl. 5, Bale, 1884: 75, pl. 6, figs. 7, 8, pl. 19, fig. 7; 1915: 277. Mulder & Trebilcock, 1914a: 8, pl. 1, figs. 7–10.

**Records:** R, 30–45 m; S, 12 m, on *Stenochladia australis*, *Phacelocarpus labillardieri*, *Scytothalia dorycarpa* and *Aerocarpia pauciculata*.

**Material:** Luxuriant colonies, some fertile. **Stems** 4–5 cm long. **Gonothecae** with long horned processes.

**Remarks:** *S. elongata* is one of the commonest epiphytic hydroids of the southern Australian coastline. The Pearson I. specimens correspond to the "short stemmed ocean form" of Mulder & Trebilcock (1914a). *S. elongata* shows a wide choice of algal substrate and considerable tolerance of environmental conditions. The stems of the present specimens were free of the encrusting coralline alga usually associated with this species.

**Crateritheca acanthostoma** (Bale, 1882). Ralph, 1961a: 756, fig. 2. Shepherd & Watson, 1970: 140. Millard, 1964: 26, fig. 7.

*Sertularia acanthostoma* Bale, 1882: 23, pl. 12, fig. 4; 1884: 85, pl. 4, figs. 7, 8; 1913: 131. Bartlett, 1907: 44. Mulder & Trebilcock, 1914: 6.

*Stereotheca acanthostoma* (Bale), Stechow, 1919: 103. Blackburn, 1942: 112.

**Records:** R, 24–33 m, on sponge and red algae.

**Material:** Two colonies of a few stems each. **Stems** to 2 cm long.

**Remarks:** The specimens agree exactly with Bale's description of *S. acanthostoma*.

**Crateritheca crenata** (Bale, 1884). Ralph, 1961a: 757, fig. 2.

#### FIG. 19

*Sertularia crenata* Bale, 1884: 86, pl. 4, fig. 2.

**Record:** R, 33 m, on brown algae.

**Material:** Two fragmentary infertile stems. *Hydrothiza* tubular, winding. **Stem** fragments 2 cm long, with 4–6 deep proximal annulations, followed by a short athecate internode below first branch. Internodes 0.13–0.26 mm long, 0.04–0.06 mm in diam. at node.

**Remarks:** The Pearson I. specimens have a much less pronounced outward bend of the distal thecal wall than *C. crenata* figured by Bale (1884). However, a microslide of *C. crenata* from Snapper Point, Vic. in the Bale collection of the NMV, compares very closely with the Pearson I. material.

This is the second record of the species, and a new record for S. Aust. (Other locality—Port Phillip Bay, Vic.)

**Salacia obliquanoda** Mulder & Trebilcock, 1914).

#### FIG. 20

*Sertularia obliquanoda* Mulder & Trebilcock, 1913b: 41, pl. 5, fig. 1, Stechow, 1926: 106. Shepherd & Watson, 1970: 140.

**Records:** R, 18–46 m, on several species of red algae, including *Metamastophora flabellata*, bryozoa, and sponge.

**Material:** Luxuriant colonies. Epiphytic colonies fertile. *Hydrothiza* loose, tubular. **Stems** simple, to 8 mm high, some giving off distal tendrils which form new stolons. **Stem** internodes variable in length, 0.54–0.66 mm, width at base of hydrotheca, 0.18–0.24 mm, joints oblique, best developed on short internodes, indistinct or absent on long internodes. *Hydrothecae* similar to the description given

by Mulder & Trebilcock, but the hydrothecal aperture is oblique, not vertical, sloping diagonally back towards the stem in a line parallel with the abcauline wall. Length of free adcauline wall 0.12–0.18 mm, fixed adcauline wall, 0.24–0.27 mm, abcauline wall, 0.21–0.30 mm long. *Margin* with 2 sharp adcauline teeth, and a thickening of thecal wall in the base of the abcauline sinus; width of margin 0.06–0.15 mm. *Gonothecae* large, barrel-shaped, 1.53–1.6 mm long, 0.96–1.06 mm wide, with 6–8 deep annulations, a circle of hooked teeth below rim. Usually 1 gonotheca on a stem, borne below the proximal hydrotheca; male and female gonophores on the one colony.

*Remarks:* With the exception of the somewhat longer stem internodes and more oblique aperture, the Pearson I. specimens compare closely with the type of *Sertularia obliquanoda* in the collection of the NMV.

Blackburn (1938, p. 319; 1942, p. 113) listed *Dynamena cornicina* McGrady, 1858, among the hydroids of the Sir Joseph Banks Group. *D. cornicina* (= *Sertularia complexa* Clarke, 1879) (see Bale 1888, p. 769; Billard 1925, p. 188) and *S. obliquanoda* are very similar, and are difficult to distinguish except in fresh fertile material. However, the hydrothecae of *D. cornicina* are larger, and the apertural teeth are more laterally situated. The abcauline opercular flap, easily visible in the present material, clearly distinguishes *S. obliquanoda* from *D. cornicina*.

The present specimens also resemble *Tridentata turbinata* (Lamouroux, 1816) (Stechow 1925, p. 223) particularly in the presence of the abcauline flap and the thickening of the abcauline wall. The status of this group needs further elucidation.

*S. obliquanoda* is one of the commonest species in the collection. This is the first definite record of *S. obliquanoda* for S. Aust. (Other localities—Torquay and Barwon Heads, Vic.)

***Sertularella robusta*** Coughtrey, 1876: 300, fig. 22; Blackburn, 1942: 115; Hodgson, 1950: 33, fig. 58. Ralph, 1961a: 824, fig. 22. Shepherd & Watson, 1970: 140.

#### FIG. 21

*Records:* R, 24–33 m; S, 15–24 m, on *Ballia calliricha*, *Laurencia elata*, *Herdmania momus*, bryozoa, and sponge.

*Material:* Numerous infertile colonies. *Stems* simple, unbranched, to 1 cm long, arising from a tubular hydrorhiza. Stem internodes variable

in length, 0.42–1.14 mm, but fairly constant in maximum width, 0.15–0.18 mm, measured just below hydrotheca. *Hydrothecae* distal on long internodes, occupying most of the length of short internodes. Length of free adcauline wall 0.3 mm, fixed adcauline wall 0.24 mm; abcauline wall 0.42 mm; maximum width of hydrotheca, 0.24 mm. Thecal walls moderately to faintly annulated with 2–3 broad undulations passing around widest part of hydrotheca.

*Remarks:* Following Ralph (1961a), those stems with a fairly thick perisarc and annulated thecal walls, even though the annulations may be faint, are assigned to *S. robusta*.

***Sertularella simplex*** (Hutton, 1873). Ralph, 1961a: 821, fig. 21.

#### FIG. 22

*Sertularia simplex* Hutton, 1873: 257.

*Sertularella peregrina* Bale, 1926: 19, fig. 4.

*Records:* R, 30 m, on the stem of *Thecocrampus divaricatus* var. *cystifera*, *Herdmania momus*, and on bryozoa.

*Material:* Colonies of a few fertile stems. *Stems* to 1 cm long, occasionally branched, arising from a tubular hydrorhiza. Stems smooth, proximal internode athecate, with a few indefinite annulations; nodes distinct, sloping alternately right and left. Internodes fairly long, 0.39–0.60 mm, becoming progressively shorter distally, until hydrotheca occupies about two-thirds of internode. Width of internode below hydrotheca, 0.17–0.20 mm. *Branches*, when present, arising just below the hydrotheca, the first branch internode with 2–3 annulations. Tendrils present, growing from the distal ends of stems and from broken hydrothecae. *Hydrothecae* with 3 internal submarginal teeth—1 abcauline, 2 adcauline; thecal walls thin and smooth, length of free adcauline wall variable, 0.33–0.40 mm, fixed wall, 0.25–0.27 mm; abcauline wall, 0.52–0.54 mm; maximum width of hydrotheca, 0.22–0.27 mm. *Margin* showing occasional reduplications.

*Remarks:* The material from Pearson I., although variable, falls well within the range of variation of *S. simplex* defined by Ralph (1961a). The specimens assigned here to *S. simplex* are easily distinguished from *S. robusta* from Pearson I. by the generally larger and smoother walled hydrothecae.

Bale (1926) erected *Sertularella peregrina* to include hydroids from Bass Strait and Port Phillip formerly referred to *Sertularella polyzonias* and *S. gaudichaudi*. *S. peregrina* is indistinguishable from *S. simplex* as now defined;

accordingly *S. peregrina* is here referred to the synonymy of *S. simplex*.

A new record for *S. Aust.*

***Sertularella annulaventricosa*** Mulder & Trebilcock, 1915: 54, pl. 7, fig. 1, pl. 8, fig. 4.

FIG. 23

*Sertularella undulata* Bale, 1915: 284, pl. 46, fig. 1. Hodgson, 1950: 34, fig. 59.

**Records:** R, 33 m, on *Sargassum* sp., on red algae, and bryozoa.

**Material:** Colonies moderately abundant, infertile. *Hydrorhiza* tubular. *Stems* simple, to 5 mm long, with 2-4 hydrothecae (exceptionally, 1 stem has 10 hydrothecae; another is branched) but many hydrothecae arising singly from hydrorhiza. *Stems* annulated proximally, annulations extending to base of first hydrotheca. *Internodes* 0.30-0.51 mm long, width below hydrotheca, 0.18 mm. *Hydrothecae* barrel-shaped, 0.27-0.36 mm in diam., at widest part. *Margin* 0.15-0.24 mm in diam., depth from margin to base, 0.30-0.36 mm.

**Remarks:** The holotype microslide of *S. annulaventricosa* in the collection of the NMV has longer stem internodes than the Pearson I. specimens, and is unbranched, although Mulder & Trebilcock note that "one specimen shows signs of having been slightly branched". The hydrothecal walls of the type are fairly smooth, with a ledge passing around the hydrotheca a little below the margin. The walls of the Pearson I. specimens are not as smooth as those of the type, and the submarginal ledge is replaced by 1-2 annular ridges, giving the hydrotheca a crumpled appearance. As in the type material, the aperture of the present material is somewhat variable in diam., ranging from a narrow orifice to almost the complete width of the hydrotheca.

This is the third record of the species, and a new record for *S. Aust.* (Other localities—central Victorian coastline, and Tasmania).

***Sertularella avrilia*** n.sp.

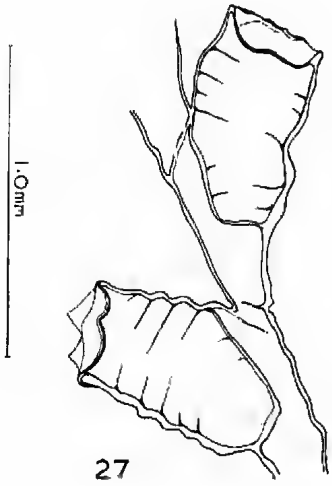
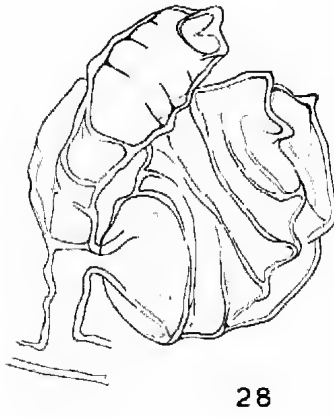
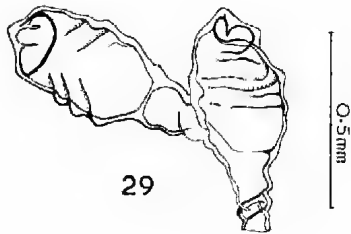
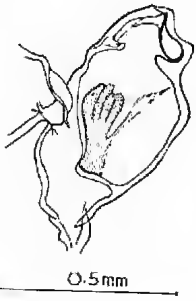
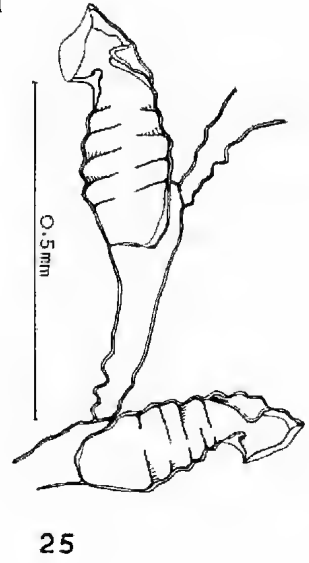
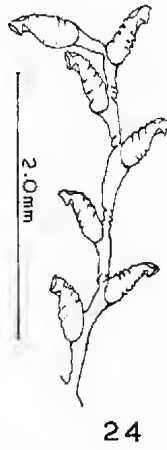
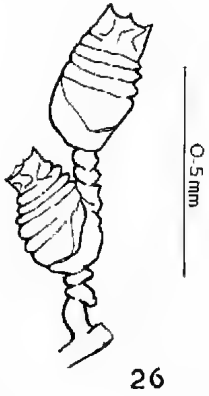
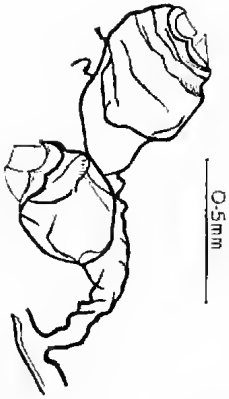
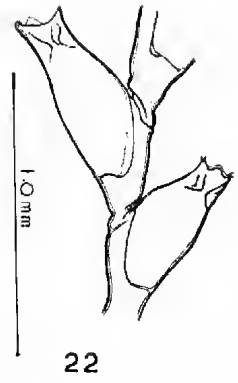
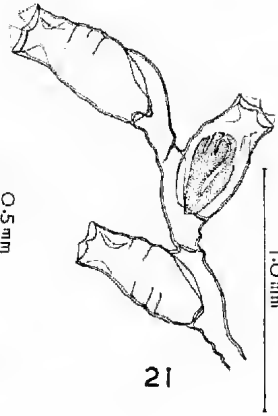
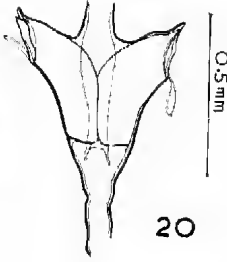
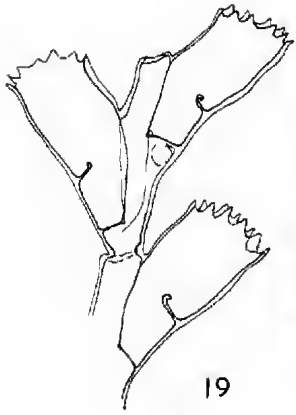
FIGS. 24, 25

**Type Material and Records:** Holotype, NMV G1964, microslide; paratypes, G1965, G1966, G1967, microslides; SAM H35, microslide; holotype and paratypes from S, 13 m, on *Sargassum verruculosum*.

**Description from holotype and paratypes:** *Stems* simple, short, to 4 mm long, unbranched, arising from a thin tubular hydrorhiza. *First stem internodes* short, with 3 proximal annulations; succeeding internodes of variable length, 0.32-0.53 mm, widening from a narrow oblique proximal node, 0.04-0.08 mm in diam., to base of hydrotheca. *Nodes* sloping alternately left and right, with 1-2 oblique annulations, remainder of internode smooth. *Hydrothecae* distal on internode, alternate, a maximum of 8 on stem, each sloping outwards parallel with line of internode, giving stem a zig zag appearance. *Body of hydrotheca* long, almost cylindrical, slightly swollen at junction with internode, 0.16-0.19 mm in diam. *Adcauline wall* with 5-7 uniform, rounded annulations, most prominent across widest part of hydrotheca, but reduced to 4-6 on abcauline wall, fading out proximally. *Adcauline wall* arched outwards, abcauline wall inflexed into a long, narrow neck, 0.10-0.20 mm at narrowest diam., expanding again to margin. *Length of free adcauline wall*, 0.36-0.45 mm, *fixed adcauline wall*, 0.12-0.14 mm; *abcauline wall*, 0.32-0.37 mm. *Aperture* facing outwards and slightly down. *Margin*, 0.11-0.14 mm in diam., with 4 broad, low teeth, the adcauline tooth most prominent; 3 strongly developed internal submarginal teeth in thecal neck—2 identical dorso-lateral bract-like teeth, and 1 long peg-shaped abcauline tooth. *Hydranth* insufficiently preserved for description, but shows evidence of an abcauline caecum. *Gonotheca*—1 immature individual, arising from the base

- Fig. 19. *Crateritheca crenata* (Bale). Part of branch with three hydrothecae.  
 Fig. 20. *Salacia obliquanoda* (Mulder & Trebilcock). One stem internode showing hydrothecae with abcauline opercular flap.  
 Fig. 21. *Sertularella robusta* Coughtrey. Part of stem showing hydrothecae with shallowly annulated walls, and hydranth with abcauline caecum.  
 Fig. 22. *Sertularella simplex* (Hutton). Part of stem showing smooth-walled hydrothecae.  
 Fig. 23. *Sertularella annulaventricosa* Mulder & Trebilcock. Part of stem.  
 Figs. 24, 25. *Sertularella avrilia* n.sp. From holotype. Fig. 24.—Whole stem. Fig. 25.—Part of stem, enlarged, showing hydrothecae and internal submarginal teeth.  
 Fig. 26. *Sertularella* sp. 1. Whole stem with two hydrothecae.  
 Fig. 27. *Sertularella* sp. 2. Part of stem with two hydrothecae.  
 Figs. 28-30. *Symplectoscyphus rostratus* n.sp. Fig. 28.—Stem with one hydrotheca and gonotheca, from holotype colony. Fig. 29.—Stem with two hydrothecae: from paratype. Fig. 30.—Hydrotheca, lateral view, showing internal submarginal teeth, from paratype.





of a proximal hydrotheca; body strongly ribbed, with signs of the development of a slender terminal neck and 4 blunt spines.

**Remarks:** *S. avrilia* resembles both *S. robusta* (Coughrey, 1876) and *S. gilchristi* Millard, 1964. However, *S. avrilia* is smaller than *S. robusta*, the hydrothecae are more strongly annulated, and it is further distinguished by the long, curved thecal neck. Although *S. avrilia* shows some affinities with *S. gilchristi*, this South African species is a large, branching form, with fascicled stem, and a shorter, less conspicuously arched thecal neck.

**Sertularella** sp. 1.

FIG. 26

**Records:** R, 21–33 m, on *Laurencia elata*, *Herdmania momus*, *Halopteris campanula* var. *campanula*, and bryozoa.

**Material:** Numerous infertile colonies. Stems simple, monosiphonic, unbranched, straggling, arising from a tubular hydrorhiza 0.05 mm in diam. Stems to 3 mm long, first stem internode short, with 2–3 indefinite annulations, following internodes thecate, of variable length, 0.06–0.24 mm, irregularly annulated except just below hydrotheca. Nodes distinct, sloping alternately right and left, 0.04–0.06 mm in diam., measured just below hydrotheca. *Hydrothecae* distal on internode, a maximum of 4 on stem; body of hydrotheca barrel-shaped, one third to one half free of internode; length of fixed adcauline wall, 0.11–0.14 mm, free adcauline wall, 0.15–0.24 mm; abcauline wall, 0.25–0.34 mm; maximum width of hydrotheca at junction of adcauline wall with internode, 0.20 mm, hydrotheca gradually narrowing to margin. Thecal wall with 5–7 strong, entire annulations, most marked in mid-region, annulations fading out towards margin. *Margin* variable in diam., 0.08–0.13 mm, with 4 sharp, equidistant teeth. *Hydranth* with abcauline caecum. *Colour*—yellow-brown.

**Remarks:** The species resembles *S. angulosa* Bale, 1894 (= *S. robusta* Ralph, 1961) but is a smaller species, with much more deeply incised thecal ridges. It is further distinguished from *S. robusta* by its straggling growth habit and the large number of hydrothecae arising directly from the hydrorhiza.

Although displaying a wide choice of substrate, occurring on algae, ascidians, bryozoa, and other hydroids, this *Sertularella* was recorded only on the exposed site, where it was very abundant.

It seems likely that this is a new species, but is indeterminate until fertile material is found.

**Sertularella** sp. 2.

FIG. 27

**Record:** R, 18 m, no substrate recorded.

**Material:** Three fragmentary infertile stems detached from the hydrorhiza. *Stems* straight, unbranched, occasionally bent slightly at a node, perisarc very thick and brittle. Internodes of variable length, 0.48–0.96 mm, nodes oblique, sloping alternately left and right, angle of slope variable. Internode narrowest at node, 0.18–0.24 mm in diam., followed by 1–2 proximal annulations, widening to base of hydrotheca; width of internode at base of hydrotheca, 0.27–0.36 mm. *Hydrothecae* occupying distal half to two-thirds of internode, standing out at about 30° to axis, very large, variable in shape, either cylindrical, or with a slight distal narrowing behind margin, 5 distinct annulations passing completely around hydrotheca, the strongest in the mid-region of the abcauline wall, fading out proximally, annulations less distinct on older hydrothecae. Length of free adcauline wall, 0.39–0.48 mm, fixed adcauline wall 0.36–0.45 mm; abcauline wall 0.66–0.72 mm. *Margin* 0.33–0.51 mm in diam., thickened, with 4 low, blunt, slightly everted teeth. Operculum of 4 flaps. *Hydranth* not well preserved, but an abcauline caecum may be present.

**Remarks:** The hydrothecae are distinctive in shape, and are the largest recorded in Australian waters for *Sertularella*. This is almost certainly a new species, but confirmation must await the collection of adequate and fertile material.

**Symplectoscyphus longithecus** (Bale, 1888).

*Sertularella longitheca* Bale, 1888: 762, pl. 16, fig. 5, 6; 1894: 101, pl. 4, figs. 7–9.

**Record:** Sta. F, 65 m, no substrate recorded.

**Material:** A few straggling infertile branched stems to 9 cm long. *Stem* internodes straight, 0.54–0.75 mm long, nodes well defined, sloping alternately right and left. Branches given off from front of stem opposite base of hydrotheca. *Hydrothecae* long, tubular, narrowing distally towards margin; length of free adcauline wall, 0.24–0.36 mm. *Margin*, 0.15–0.18 mm in diam. One hydrotheca shows regeneration after breakage at base.

**Remarks:** The Pearson I. material compares well with Bale's (1888) specimens from Port Dennison and Port Phillip Bay, but they have

a shorter length of hydrotheca free of the internode than Ritchie's (1911) specimens from Wata Mooli, N.S.W.

This is only the fourth record of this apparently rare deeper water species, and a new record for S. Aust.

**Symplectoscyphus subdichotomus** (Kirchenpauer, 1884). Ralph, 1961a: 813, fig. 20.

*Sertularella subdichotoma* Kirchenpauer, 1884: 46, pl. 16, fig. 1. Bale, 1914a: 20 (discussion).

**Records:** R, 30 m, on bryozoa; Stn. F, 65 m, on bryozoa.

**Material:** Two colonies, each of a few infertile stems. Stems straggling, to 4 cm long, alternately, but irregularly branched. Nodes present on stem and branches, stem internodes indistinct, 1-3 annular constrictions at junction of branch with stem; several branches terminating in tangled anastomoses. *Hydrothecae* somewhat conical, with a slight concavity in middle of abcauline wall; a fine diagonal line running from the base of the adcauline wall to a small internal peg in the flexure of the abcauline wall.

**Remarks:** The Pearson I. specimens compare closely with microslides of *Sertularella divaricata* from the Great Australian Bight in the collection of the NMV (Bale 1914a, p. 20).

**Symplectoscyphus neglectus** (Thompson, 1879). Shepherd & Watson, 1970: 140.

*Sertularella neglecta* Thompson, 1879: 100, pl. 15, fig. 1. Bale, 1884: 110, pl. 3, fig. 3, pl. 19, fig. 22, 23; 1915: 287. Blackburn, 1942: 115.

*Symplectoscyphus* sp. Ralph, 1966: 163, figs. 1-4.

**Records:** R, 25-30 m, on *Delisea pulchra*, *Metagoniolithon charoides*, and other red and brown algae.

**Material:** Luxuriant fertile colonies. Stems to 3 cm long, beginning with 2-3 oblique proximal twists, branches subalternate, no secondary branching, but occasionally a branch produced into a tendril. *Hydrothecae* triangular in section in young stems, with 3-4 distinct annular ridges, thecal walls of mature specimens much thickened and rounded, the annulations less distinct; marginal teeth of younger hydrothecae long and sharply pointed, blunt in older specimens. One-3 small internal submarginal teeth, sometimes not developed, but in mature hydrothecae may be thickened and projecting into centre of cell. *Gonothecae* abundant, male and female on separate stems. Female gonophores borne thickly on stem and proximal part of branches; male gonophores borne only on mid-

region and distal part of branches. Both sexes on a short pedicel arising beside a hydrotheca; body with 10-15 annulations and 2 hollow, conical distal processes. Female gonotheca stout, inflated, widest near middle, blastostyle spindle-shaped, supporting a cluster of ova. Male gonotheca long, narrow, widest near base, with a short distal obliquely inclined neck, blastostyle thin, rod-shaped, becoming indistinct distally.

**Remarks:** Bale (1884) in his redescription of *S. neglectus*, had only dried material before him, and inferred the transversely wrinkled, triangular hydrothecae to be artifacts of drying. However, much of the present material, particularly the younger stems, shows this to be a normal character of the species.

Bale's surmise that *S. neglectus* would show sexual dimorphism is demonstrated by the Pearson I. material. His figure "a" (Pl. XIX, fig. 23) with "two large conical hollow teeth, one more elevated than the other" is a female gonotheca, and gonotheca "h" (fig. 22) with "teeth smaller and about equally elevated" is male. In the Pearson I. material, the tooth-like conical processes of the female gonothecae are of approximately equal height, while those of the male are of unequal length and fairly short, but this is variable throughout the range of specimens. Ralph (1966) described and figured *Symplectoscyphus* sp. (from Port Phillip Heads) with smooth hydrothecae of triangular section and sharply erect marginal teeth. Although the hydrothecae are smoother than usual, the two latter characters clearly distinguish her material as young specimens of *S. neglectus*.

*S. neglectus* is a very common epiphytic hydroid in southern Australian waters, occurring on a variety of algae. It is easily recognised in the field by the incurved habit of the branches, the encrustation of pink coralline algae usually present, and the bright yellow gonothecae. The short marginal teeth seen on older hydrothecae are probably the result of constant abrasion against other stems and algae in the very turbulent conditions in which it is usually found.

**Symplectoscyphus indivisus** (Bale, 1882). Ralph, 1961a: 803, fig. 15. Shepherd & Watson, 1970: 140.

*Sertularella indivisa* Bale, 1882: 24, pl. 12, fig. 7; 1884: 105, pl. 3, fig. 5, pl. 19, fig. 27; 1915: 285. Blackburn, 1942: 115.

**Records:** R, 21-45 m, on *Laurencia elata* and *Sargassum spinuligerum*; S, 12-30 m,

on *Sargassum* spp., *Distromium* sp., and *Polysiphonia* sp.

**Material:** Colonies abundant, 1 colony fertile, growing from a loosely wound hydrorhiza. Stems to 5 mm long; gonothecae clustered thickly at base of stems. **Colour**—bright yellow.

**Remarks:** The colonies fall within the known range of variation of *S. indivisus*, but are separable into 2 distinct morphological groups. The first group comprises stems with short, strongly undulated internodes, often completely occupied by the hydrotheca. The hydrothecae are inflated, irregularly undulated, with a short submarginal neck. The gonothecae are squat, deeply crumpled, with a very short pedicel. This group compares with Bale's (1888) *S. indivisa* from Portland, Vic. and figs. 5, 6, of *S. variabilis* from Port Jackson, N.S.W. The neck region of the Pearson I. specimens are however, more contracted than those figured by Bale.

The stem internodes of the second group are longer, and both internodes and hydrothecae are less inflated than those of the first group. The thecal wall is only occasionally faintly undulated, and the neck region is longer. The colonies are infertile.

There is thus a good correlation between stem morphology and environmental conditions, as the robust (fertile) stems were found only on the rough-water site, whereas the more flexuous (infertile) stems occurred only on the sheltered side of the island.

#### ***Symplectoscyphus pygmaeus*? (Bale, 1882).**

*Sertularella pygmaeus* Bale, 1882: 25, pl. 12, fig. 9; 1884: 108, pl. 3, fig. 8, pl. 19, fig. 19. Blackburn, 1942: 115. Hodgson, 1950: 36, figs. 63, 64.

*Symplectoscyphus pygmaeus* (Bale). Ralph, 1961a: 805, fig. 16.

**Records:** R, 18–30 m, on *Herdmania momus*, bryozoa and compound ascidians; S, 18–24 m, on stem of *Thecocarpus divaricatus* var. *cystifera*.

**Material:** Infertile colonies comprising a few stems to 4 mm long. **Colour**—bright yellow.

**Remarks:** It is difficult to distinguish between infertile material of *S. pygmaeus* and *S. rentoni* (Bartlett, 1907). Ralph (1961) distinguishes between the two species on the line of fine dots passing from the base of the adcauline wall to a point one third the distance up the abcauline wall in *S. pygmaeus*, and a lower diagonal in *S. rentoni*. However, examination of a series of microslides of *S. pygmaeus* in the collection of the NMV, shows that this is not

a reliable distinction, as the height of the diagonal varies considerably between different stems, and even among hydrothecae on the same stem.

Most of the hydrothecae of the Pearson I. material have a line of dots joining the abcauline wall about one quarter the distance up from the base, a distance greater than that given by Ralph as diagnostic for *S. pygmaeus*, the junction being marked by a thickened notch on the inside of the wall. As the Pearson I. specimens most closely resemble *S. pygmaeus*, especially one slide in the Bale collection (NMV) labelled "Queenscliff, 1881", the specimens are provisionally assigned to this species.

#### ***Symplectoscyphus macrothecus* (Bale, 1882).**

Shepherd & Watson, 1970: 140.

*Sertularella macrotheca* Bale, 1882: 25, pl. 13, fig. 1; 1884: 107, pl. 3, fig. 4, pl. 19, fig. 24. Bartlett, 1907: 65, fig.

**Records:** R, 24 m, on *Acrocarpia paniculata*.

**Material:** One infertile colony of a few stems. *Hydrorhiza* a coarse undulating tube. *Stems* to 4 mm long, robust, athecate part very short, with a strong distal constriction. *Internodes* conspicuously inflated behind hydrotheca, nodes sharply twisted. *Hydrothecae* large, 2–6 on stem, completely occupying internode; fixed adcauline wall 0.18–0.20 mm, free adcauline wall 0.35–0.40 mm; abcauline wall 0.35–0.40 mm. Thecal wall smooth, with a notch on abcauline side below margin, opposite the submarginal tooth. *Margin* 0.15–0.20 mm in diam. lateral view. Three internal submarginal teeth, the abcauline tooth best developed.

**Remarks:** The present material agrees well with descriptions and figures by Bale of *S. macrotheca*.

#### ***Symplectoscyphus rostratus* n.sp.**

FIGS. 28–30

**Type material and Records:** Holotype, NMV G1981, microslide—R, 27–30 m, on *Sargassum verruculosum*; G2095, preserved material, remainder of holotype colony; paratypes, NMV G1982—R, 27–30 m, on *Sargassum verruculosum*; G1983—R, 33 m, on bryozoa; G1984—R, 27–30 m, on *Sargassum verruculosum*, microslides; SAM H36—S, 46 m, on red algae; microslide.

**Descriptions from holotype and paratypes:** *Hydrorhiza* tubular, loosely adherent to substrate. *Stems* short, to 2 mm long, unbranched, bearing 1–3 hydrothecae, perisarc thick and brittle. *Stem internodes* twisted, inflated behind



hydrotheca, proximal internode with 2-3 annulations; width of internode at base of hydrotheca 0.17-0.26 mm. *Hydrothecae* alternate, occupying most of internode, directed towards front of stem, each succeeding internode arising behind base of preceding hydrotheca, directed outwards, giving stem a zig-zag appearance. Hydrotheca barrel-shaped, narrowing to margin, with 2-3 shallow annular ridges passing completely around mid-region of thecal wall. Depth of hydrotheca (from base to margin) 0.42-0.50 mm; 0.27-0.30 mm in diam. at widest part. *Margin* contracted, small, rim heavily thickened, with 3 teeth—1 blunt tooth in the central adcauline position, forming a raised beak-shaped crest; 2 blunt, low lateral teeth, flanking crest. Abcauline side of margin a shallow curve. *Margin* 0.12-0.16 mm in diam. (lateral view). 0.10-0.13 mm high (adcauline embayment to crest). Aperture facing obliquely outwards, depressed into the distal ridge of the abcauline wall. Four internal submarginal teeth—2 adcauline, long, flanking marginal crest, projecting downwards into cell; 1, low and ledge-like (not well seen in anterior view) just below margin in the centre of the abcauline embayment, and 1, similar in shape, but smaller, deep in the adcauline side of thecal neck, directly opposite the abcauline submarginal tooth, seen only in lateral view. *Hydranth* with abcauline caecum, connected by a delicate web to the abcauline wall below the internal tooth. *Gonothecae* large, ovate, 0.8 mm long, 0.6 mm wide, arising from a short pedicel below proximal hydrotheca, with 5 strong, crumpled annular ridges, and 3 low, fairly sharp apertural teeth.

**Remarks:** The material of *S. rostratus* from Pearson 1, included only 2 gonothecae, one of which was immature.

*S. rostratus* is in some respects transitional between the smaller forms of *S. indivisus* Bale, and *S. macrothecus* Bale, resembling the former in general aspect of the trophosome and gonosome, and the latter in the arrangement of the internal submarginal teeth. There is however, only 1 abcauline submarginal tooth in *S. rostratus*, compared to 3 in *S. macrothecus*. In *S. indivisus*, the 3 marginal teeth are alternate with the marginal teeth. The raised adcauline crest further distinguishes *S. rostratus*.

*Symplectoscyphus epizoicus* n.sp.

FIGS. 31-33

**Type Material and Records:** Holotype, NMV G1985, microslide—S. 20 m, on *Thecocarpius divaricatus* var. *cystifera*; G2096, pre-

served material, remainder of holotype colony; paratypes, G1986, G1987, G1988, microslides—R, 30 m, on *T. divaricatus* var. *cystifera*; SAM H33, microslide.

**Description from holotype and paratypes:**

*Hydrorhiza* tubular, of same diam. as stems. *Stems* simple, short, unbranched, to 3 mm long. Proximal stem internode short, athecate, with 4-5 annulations, width 0.13 mm; following internodes of variable length, 0.50-1.05 mm. *Hydrothecae* large, perisarc delicate, alternate, in one plane, a maximum of 4 on stem, not immersed in internode, distal on long internodes, occupying almost the whole length of short internodes, without definite floor, barrel-shaped, widest about middle, narrowing only slightly to margin. Length of fixed adcauline wall 0.22-0.28 mm, free adcauline wall 0.21-0.30 mm; abcauline wall 0.45-0.53 mm. *Margin* 0.28-0.31 mm in diam., thickened, with 3 equi-distant bluntly pointed teeth—1 adcauline, 2 lateral abcauline. Operculum of 3 delicate flaps. No internal submarginal teeth. *Hydranth* with approx. 24 tentacles, and an abcauline caecum. *Gonothecae* large, ovate, nearly 3 times length of hydrotheca, 1.11-1.35 mm long, widest at top, 0.87-1.02 mm, tapering to a short pedicel arising below proximal hydrotheca, walls faintly undulated proximally, the annulations more distinct about mid-region. Aperture small, circular, 0.13-0.15 mm in diam., depressed into the most distal annulation of the gonothecal wall; 4 very low rounded teeth. Gonophores female, mature, not filling gonothecal cavity, with 10-16 eggs. *Colour*—yellow.

**Remarks:** The colonies arise from a single stolon running up the main stem and branches of the host, the stems and occasional single hydrothecae given off at irregular intervals.

*S. epizoicus* resembles one of the larger forms of *S. indivisus* (Bale) (i.e. "*Sertularella variabilis*" Bale, 1888) in size and structure, and could easily be confused with this species in preserved material. However, *S. epizoicus* lacks the internal submarginal teeth which distinguishes *S. indivisus*.

**Sertularia macrocarpa** Bale, 1884: 80, pl. 5, fig. 2, pl. 19, fig. 11; 1914a: 14; 1915: 277. Mulder & Trebilcock, 1914b: 42. Hodgson, 1950: 27, fig. 47. Shepherd & Watson, 1970: 140.

**Records:** R, 28-34 m; S, 4-25, among holofasts of red algae.

**Material:** Colonies abundant, growing in thick tangled clusters. *Stems* to 12 cm long, infertile except for 1 gonotheca. **Colour**—dark brown. **Remarks:** This distinctive species is easily recognized by its dark colour, and large, tangled colonies which usually grow at the base of algae in semi-sheltered situations.

**Sertularia unguiculata** Busk, 1852: 394. Bale, 1884: 76, pl. 6, figs. 9–12; 1894: 100; 1914a: 16; 1915: 273. Blackburn, 1942: 113. Hodgson, 1950: 26, figs. 45, 46. Ralph, 1961a: 788, fig. 13.

**Records:** S, 25 m, on *Herdmania momus*, and among algal holdfasts.

**Material:** Several large infertile colonies. *Stems* short, to 3.5 cm, unbranched. Proximal branch internodes with 3 pairs of hydrothecae, each succeeding internode with 2 pairs of hydrothecae, nodes indistinct. *Hydrothecae* on branches adnate for two-thirds of length; cauline hydrothecae not immersed in stem. **Colour**—orange brown.

**Remarks:** Although shorter, the stems in the present collection conform to Bale's (1884) description of the thick stemmed, long internode form of *S. unguiculata*.

Although relatively common at Pearson I. *S. unguiculata* was restricted to sheltered water.

**Sertularia bicuspidata** Lamarck, 1816: 21. Blackburn, 1937: 367.

*Sertularia bicornis* Bale, 1882: 22, pl. 12, fig. 3; 1884: 83, pl. 5, fig. 9.

**Records:** R, 45 m, on *Rhodopeltis australis* and *Metamastophora flabellata*.

**Material:** A few infertile stems. *Stems* stiffly erect, branched, to 1 cm long. **Colour**—dark brown.

**Remarks:** The distinctive paired finger-like processes flanking the margin distinguish this species from all other species of *Sertularia* in Australian waters.

This is the first undoubted record of *S. bicuspidata* from S. Aust. (Other localities—Queenscliff, and Lady Julia Percy I., Vic.)

**Sertularia maccallumi** Bartlett, 1907: 62, fig. Mulder & Trebilcock, 1914a: 7, pl. 1, figs. 1–3. Bale, 1919: 340, pl. 16, figs. 3, 4. Shepherd & Watson, 1970: 143.

**Records:** R, 25–45 m, on *Carpopeltis phyllopora* and *Pterocladia lucida*.

**Material:** Luxuriant fertile colonies thickly over-running algae. *Stems* to 4 mm long.

**Colour**—hydrorhiza brown, hydrocaulus bright yellow.

**Remarks:** *S. maccallumi* is one of the commonest hydroids in the Pearson I. collection. Although both species of algae were also recorded at West I. (Shepherd & Watson 1970), *S. maccallumi* was never found on *P. lucida*, and only occasionally on *C. phyllopora* at that locality.

**Sertularia acuta** (Stechow, 1921), Millard, 1958: 192, fig. 8. Shepherd & Watson, 1970: 140.

*Sertularia loculosa* Bale, 1884: 91, pl. 4, figs. 5, 6; 1913: 121, pl. 12, figs. 7, 8; 1915: 272.

*Tridentata acuta* Stechow, 1921: 231.

*Sertularia balei* Briggs, 1922: 150.

**Records:** R, 45 m; S, 15 m, on *Stenocladia australis*.

**Material:** Abundant fertile colonies. *Stems* unbranched, to 5 mm long, internodes with an oblique proximal, and a transverse distal joint; exceptionally, a transverse joint is followed by 2 oblique joints. **Colour**—yellow. *Gonothecae* with 4–5 deep annulations.

**Remarks:** The Pearson I. specimens correspond closely to the short-celled form of "*S. loculosa*" Bale.

Millard (1958, p. 198) distinguishes *S. acuta* from *S. turbinata* (Lamouroux, 1816) in her South African material partly by the presence of transverse stem nodes in the former species, and oblique nodes in *S. turbinata*. The Pearson I. material has both transverse and oblique joints on the one stem, thus further reducing the difference between these two closely related species. *S. acuta* is a common epiphytic species in the collection and is associated with only one species of alga.

**Amphisbetia maplestonei** (Bale, 1884). Rees & Thursfield, 1965: 142. Shepherd & Watson, 1970: 140.

*Sertularia maplestonei* Bale, 1884: 70, pl. 6, fig. 4, pl. 19, fig. 2.

*Sertularia bidens* Bale, 1884: 70, pl. 6, fig. 6, pl. 19, fig. 1; 1914a: 16.

**Records:** R, 34 m; S, 25 m, among algal holdfasts.

**Material:** Luxuriant fertile colonies. *Stems* flexuous, 5–12 cm long.

**Remarks:** The distal conical processes of the gonothecae are moderately well developed, but many gonothecae have only 1 process on the abcauline side.

**Amphisbetia pulchella** (Thompson, 1879).  
Shepherd & Watson, 1970: 140.

*Sertularia pulchella* Thompson, 1879: 109, pl. 18, figs. 3, 3a, Bale, 1884: 71, pl. 6, fig. 5, pl. 19, fig. 10.

*Sertularia maplestoni* (Bale), Blackburn, 1942: 113.

**Records:** R, 45 m, on *Pterocladia lucida*; S, 14 m, on bryozoa epiphytic on algae.

**Material:** A few infertile stems to 1 cm long.

**Remarks:** Blackburn (1942) included *A. pulchella* in the synonymy of *A. maplestoni* although *A. pulchella* is a prior name. Although similar in microscopic details of the trophosome, the two species seem to be distinct, and are readily distinguished by the gonothecae and size of the stem. The stems of *A. maplestoni* are long and robust, while those of *A. pulchella* rarely exceed 2 cm. Both species are epiphytic; the larger species, *A. maplestoni*, is confined to the basal parts of algae, while the more delicate *A. pulchella* epiphytises the fronds. Possibly, further work may prove the two to be ecomorphs of the one species.

**Amphisbetia olseni** n.sp.

FIGS. 34-37

**Type Material and Records:** Holotype, NMV G2001, microslide—R, 33 m, on sponge; G2097, preserved material, remainder of holotype colony; paratypes, G2002, G2003, G2004, microslides—R, 33 m, on *Herdmania momus*; G2005—S, 17-33 m, on brown algae, microslide; G2098, remainder of paratype colony G2005; G2006—R, 33 m, on red algae, microslide; SAM H34—R, 33 m, on sponge, microslide.

**Description from holotype and paratypes:** *Hydrorhiza* tubular. Stems to 7 mm long, monosiphonic, stiffly erect, branched. Proximal stem internodes athecate, terminating in a strong V-shaped joint, succeeding internodes thecate, nodes indistinct, but if present, V-shaped, slender. Internodes 0.52 mm long, diam. at node, 0.06-0.09 mm; 3 hydrothecae on stem internodes, 1 axillar, 2 subopposite. **Branching** regularly alternate, up to 5 branches on stem, arising from a long proximal apophysis given off at 70° to stem. First branch internode very short, athecate, with a transverse proximal, and V-shaped distal joint; remainder of branch without internodes, but with up to 5 pairs of hydrothecae. *Hydrothecae* on branches subopposite, in 1 plane, adnate approx. two-thirds of their length, saccate, widest near middle, narrowing to margin. Fixed adcauline wall 0.12-0.16 mm long, free ad-

cauline wall 0.05-0.08 mm, standing out horizontally, or at a slight upward angle from the internode. Abcauline wall 0.16-0.19 mm, a pronounced inflexure about one-third the distance up from the base, followed by a sharp outward bend, but this may be reduced to a mere concavity in the abcauline wall. Paired hydrothecae on younger parts of stem and branches in contact along fixed adcauline wall, but separated in older parts of stem; if in contact, the adcauline wall is straight, otherwise it is bent parallel to the inflexure of the abcauline wall. **Margin** with 2 long sharply pointed lateral teeth 0.07 mm long, separated by a deep, almost horizontal abcauline sinus; adcauline wall indented behind margin. **Operculum** of 2 flaps, abcauline component fixed. *Hydranth* with approx. 12 tentacles. *Gonothecae* arising from lower stem behind proximal pair of hydrothecae, large, ovate, flattened, 1.02-1.32 mm long. Perisarc thick, walls smooth, widening distally to a shoulder 0.84-1.02 mm width, produced into a pair of short, almost laterally directed spines. Aperture circular, 0.35 mm. in diam., with a slightly raised collar and a ring of minute internal denticles. **Operculum** a circular flap. *Gonothecae* empty. **Colour**—light straw colour.

**Remarks:** The branching in *A. olseni* is regularly alternate; where a branch fails to develop, the stem internode is longer, and has 1 axillar, and 2 pairs of subopposite hydrothecae, then branching resumes again. The branches are very brittle and break off easily at the slender proximal joint.

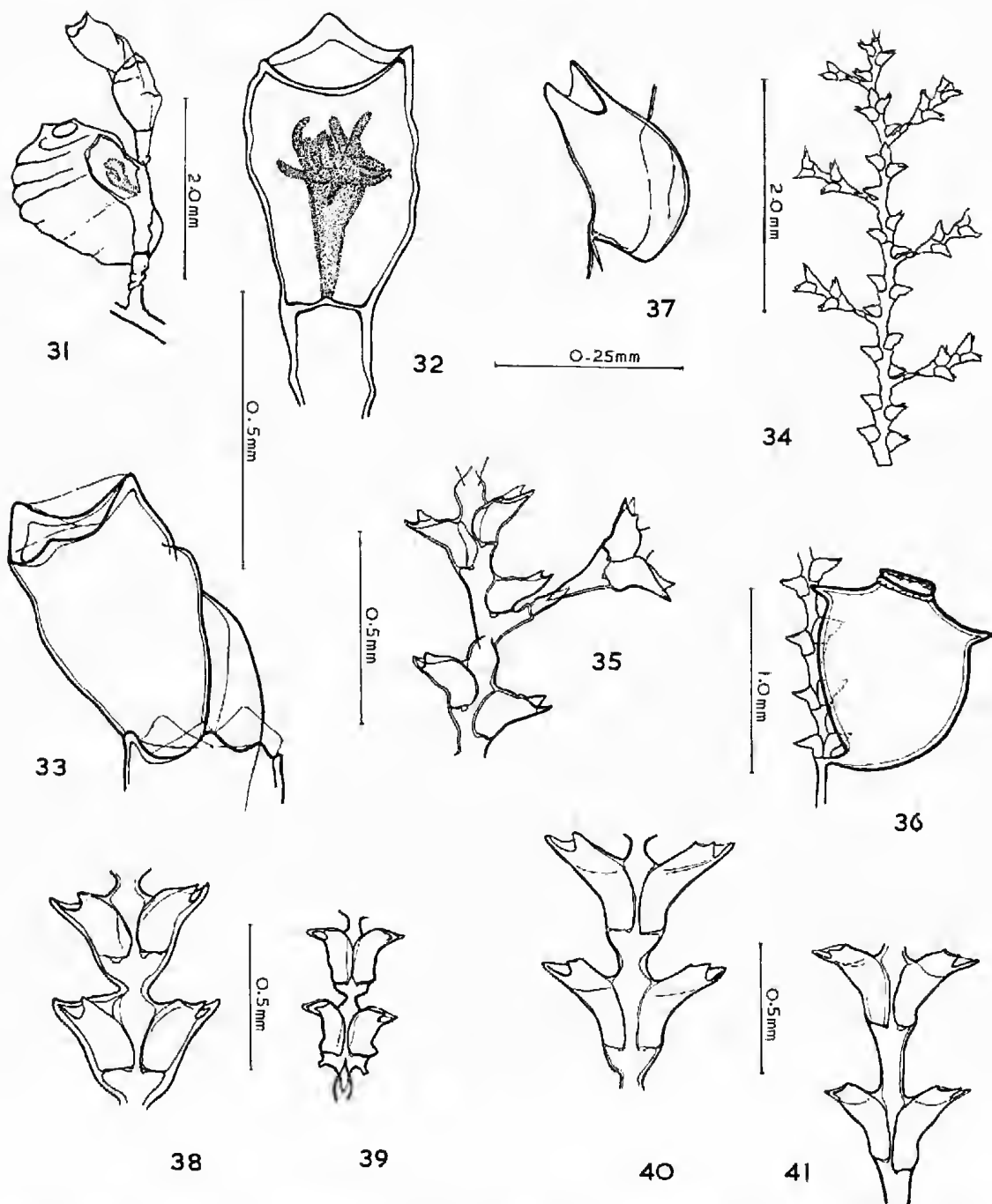
*A. olseni* is closely related to both *A. pulchella* (Thompson) and *A. bidens* (Bale) in structure of the trophosome and gonosome, but is distinguished from these species by the straighter, less flexuous stem, the pronounced concavity of the abcauline thecal wall, the less prominent marginal teeth, the greater proportion of the hydrotheca adnate to the internode, and the shape of the gonotheca.

With one exception (S, 17-33 m), the colonies were all found within the same area on the rough water site.

*A. olseni* is named after Mr. A. M. Olsen, whose interest and encouragement has done much to foster marine science in South Australia.

**Amphisbetia minima** (Thompson, 1879).  
Ralph, 1961a: 774, fig. 8. Shepherd & Watson, 1970: 140.

FIGS. 37, 38



- Figs. 31–33. *Symplectoscyphus epizoicus* n.sp. Fig. 31.—Whole stem with gonotheca. Fig. 32.—Hydrotheca enlarged, anterior view, with hydranth. Fig. 33.—Hydrotheca, lateral view. Drawn from holotype.
- Figs. 34–37. *Amphisbetia olseni* n.sp. Fig. 34.—Whole stem, from holotype. Fig. 35, part of stem and branch, enlarged. Fig. 36.—Part of stem and gonotheca, from paratype. Fig. 37.—Hydrotheca, enlarged.
- Fig. 38. *Amphisbetia minima* var. *pumiloides* Bale. Part of stem with two internodes.
- Fig. 39. *Amphisbetia minima* var. *intermedia* Bale. Part of stem with two internodes. Figs. 38 and 39 drawn at same scale for comparison.
- Fig. 40. *Amphisbetia minuscula* Bale. "Short internode form".
- Fig. 41. *Amphisbetia minuscula* Bale. "Long internode" form.



*Sertularia minima* Thompson, 1879: 104, pl. 17, fig. 3; Bale, 1882: 21, 45, pl. 12, fig. 2; 1884: 89, pl. 4, figs. 9, 10, pl. 19, figs. 12, 13; 1915: 269; 1924: 248. Mulder & Trebilcock, 1914b: 39. Streehow, 1925: 231, fig. K. Blackburn, 1942: 114. Hodgson, 1950: 23, figs. 41, 42. Millard, 1957: 221.

**Records:** R, 12–50 m; S, 15–25 m, on algae (see Remarks).

**Material:** Luxuriant fertile colonies. *Stems* to 5 mm long. **Colour**—light brown.

**Remarks:** Bale recognized 3 varieties of *A. minima* in southern Australian waters, the largest, var. *pumiloides* Bale, 1884 (from Queenscliff, Vic.), a "typical" form from Port Phillip Bay and New Zealand waters, and var. *intermedia* Bale, 1915, from the Nuyts Archipelago in the Great Australian Bight. Ralph's (1951) figures and description show her New Zealand specimens to be closely allied to the Australian typical form, but there are nematothecae scattered throughout the hydrocaulus, a condition not normally encountered in the Australian material. *A. minima* is one of the most abundant hydroids in the Pearson I. collection, and the material examined falls with little intergradation into 2 of the varieties, var. *pumiloides* and var. *intermedia*. Although difficult to distinguish in preserved material, the varieties are easily separated in mounted preparations. These varieties have not previously been recorded together in the one locality.

The present material corresponding to var. *pumiloides* is a robust form, conforming to Bale's (1884) description. The hydrothecae are almost entirely adnate, and the typical wedge of perisarc between hydrotheca and internode is well developed. The gonothecae are variable in shape, round to elongate in lateral view; those with a raised apertural collar do not have a ring of internal submarginal denticles. The var. *intermedia*, not figured by Bale, is much smaller, with shorter internodes, and rectilinear hydrothecae. Nematothecae, varying from short cylindrical tubules to mere breaks in the perisarc, are present on all stems, but are confined to the infrathecal chamber of the proximal hydrothecae. Gonothecae are round to ovate. Dimensions of the 2 varieties from Pearson I. are given for comparison.

	var. <i>pumiloides</i>	var. <i>intermedia</i>
Internode length	0.35–0.38	0.25–0.27
Diam. at node	0.05–0.08	0.03–0.04
Hydrotheca length	0.24–0.29	0.17–0.22

With few exceptions (Ritchie 1911), *A. minima* is recorded as an epiphytic species, and

at Pearson I. the 2 varieties show a strong selectivity towards certain species of algae. The var. *pumiloides* was found only on the robust brown algae *Sargassum bracteolosum*, *S. varians*, and *S. verruculosum*, as well as *Acrocarpha paniculata*; var. *intermedia* was associated with the more delicate red algae *Rhodomenia australis*, *Metamastophora flabellata*, *Laurencia elata*, and *Carpopeltis phyllophora*, with one record on the delicate brown alga, *Distromium flabellatum*. Shepherd & Watson (1970) noted that many commonly epiphytic hydroids show varying degrees of preference for particular species of algal substrate, but a differential selectivity by varieties of the same species has not previously been recognized.

Almost all the colonies have the pegged hydrorhiza typical of *A. minima*. Bale (1915) and Mulder & Trebilcock (1914a) noted this fact; Ritchie (1911) suggested it may be a response to wave action, but Ralph (1961) could find "no constant relationship to environmental conditions" to account for the thickenings. In many of the colonies of both varieties of *A. minima* from Pearson I., the hydrorhiza is often tubular and loosely winding when in contact with the curved and cylindrical surfaces of the lower stems of the alga, then flattening out and developing the transverse markings as the stolon passes onto the broader fronds. This change in cross section of the stolon may therefore be either a response to the greater movement of the algal frond in turbulent water, or it may be related to the nature of the algal surface.

The systematic status of the 3 so-called varieties of *A. minima*, and of the whole "*A. minima*" group, including *A. minuscula* Bale, *A. furcata* Trask, and *A. muelleri* Bale, needs further elucidation. It is possible that all may be ecologic variants of the one species, or several distinct, but closely related species.

#### ***Amphisbetia minuscula* (Bale, 1919).**

**FIGS. 40, 41**

*Sertularia minima* var. *tubotheca* Mulder & Trebilcock, 1914b: 40, pl. 4, fig. 1.

*Sertularia pusilla* Bale, 1915: 271, pl. 46, figs. 3–6.

*Sertularia minuscula* Bale, 1919: 340. Blackburn, 1942: 114.

**Records:** R, 30–40 m, on *Laurencia elata*, *Distromium flabellatum*, and *Herdmania momus*; S, 25–31 m, on the stem of *Caulerpa* sp., and *Halicornaria longirostris*.

**Material:** Abundant colonies, some fertile. *Stems* simple, to 5 mm long, internodes variable. The stems are divisible into 2 groups—a

long internode group, internodes 0.42–0.44 mm long, and a short internode group, internodes 0.30–0.34 mm long. Nodes of both stem groups 0.06 mm wide, indistinct, transverse, occasionally a V-shaped joint in distal region of stem. *Hydrothecae* similar to descriptions of authors, fixed adcauline wall 0.19–0.22 mm, free adcauline wall 0.07–0.11 mm; abcauline wall 0.19–0.26 mm; an indistinct downwardly curved ridge passing back from the embayment between the marginal teeth into the junction of the adcauline wall with the internode. *Gonothecae* 1.20–1.26 mm long, excluding pedicel, maximum width, 0.75–0.97 mm, present only on the "short internode" form.

**Remarks:** The hydrothecae of the "long internode" form of the Pearson I. material are larger than those of the "short internode" form, but both are smaller than measurements from microslides of *A. minuscula*, and the type of "*A. minima* var. *tubatheca*" in the collection of the NMV. The "long internode" form conforms with measurements of *A. pusilla* (Bale), while the "short internode" form is similar to the var. *tubatheca* of Mulder & Trebilcock. The nematothecae noted by Bale and Mulder & Trebilcock are present in only a few of the proximal stem internodes of the Pearson I. specimens; the intrathecal ridge, noted in the present material, is not present in the type. *A. minuscula* displays a wide choice of substrate. Some correlation evidently exists between stem type and environmental conditions, since the "long internode" form was abundant on the sheltered site, whereas the more robust "short internode" form was found only on the rough-water side of the island. This suggests that development of a thickened stem with short internodes is advantageous to withstand rough water conditions.

#### Family PLUMULARIIDAE

##### *Pycnotheca producta* (Bale, 1882).

*Plumularia producta* Bale, 1882: 39, pl. 15, fig. 3; 1884: 133, pl. 10, fig. 4; 1894: 111.  
*Kirchenpueria producta* Bale, 1914a: 59, 1915: 302. Blackburn, 1942: 107.

**Records:** R, 24 m, on *Distromium flabellatum*; S, 24 m, on *Hymenena*?

**Material:** A few scattered infertile colonies. **Stems** to 9 mm long.

**Remarks:** The material conforms exactly to Bale's description of *P. producta*.

##### *Antennella tubulosa* (Bale, 1894).

FIG. 42

*Plumularia tubulosa* Bale, 1894: 114, pl. 5, figs. 2–5.

**Records:** R, 27–30 m, on bryozoa; S, 26–30 m, on *Sargassum* sp.

**Material:** Several colonies, each comprising a few infertile stems. **Stems** to 3 mm long, arising from a thick hydrorhiza. First internode with a proximal constriction, followed by an athecate internode with 1–2 nematothecae and an oblique distal node. Athecate internodes 0.11–0.16 mm long; thecate internodes as described by Bale, 0.27–0.37 mm long, with 1 median nematotheca and 2 scoop-shaped lateral nematothecae. *Hydrothecae* long, 5–6 on a stem, proximal part tubular, perisarc thick, adcauline wall 0.25–0.27 mm long; abcauline wall 0.22–0.30 mm long, distal part of adcauline wall more convex than abcauline side. **Margin** 0.13–0.15 mm in diam., deeply sinuated, curving up to meet produced adcauline wall. **Colour**—yellow.

**Remarks:** The Pearson I. material, although definitely referable to *A. tubulosa*, nevertheless shows considerable variability in thickness of perisarc, length, diam. of internode, and shape of hydrothecae. Bale (1894) considered that *A. tubulosa* may be a variant of *H. campanula*, or the "Antennella" form of an unknown Plumularian.

As the present material shows no sign of branching, *A. tubulosa* may therefore be considered a distinct species.

This is the second record of *A. tubulosa*, and a first record for S. Aust. (Other locality—Port Phillip Bay, Vic.)

##### *Antennella campanuliformis* (Mulder & Trebilcock, 1909).

FIGS. 43, 44

*Plumularia campanuliformis* Mulder & Trebilcock, 1909: 31, pl. 1, figs. 6, 9, 10; 1911: 115.

**Records:** R, 30–45 m, on *Sargassum* sp., *Laurencia elata* and *Pterocladia lucida*.

**Material:** Colonies common, fertile. The specimens conform to the type microslide of *Plumularia campanuliformis* in the collection of the NMV. The following description supplements that of Mulder & Trebilcock.

**Hydrorhiza** tubular. **Stems** to 1 cm long, first stem internode 0.5 mm long, athecate, with 1–2 nematothecae and 1–2 proximal annulations, distal node oblique, following internodes alternately thecate and athecate. Thecate internodes 0.39–0.45 mm long, almost entirely occupied by the hydrotheca, with an oblique proximal node, and a transverse distal node, 0.06–0.09 mm wide, often indistinct; athecate internode short, 0.28–0.31 mm (measured along base of hydro-

cladium). *Hydrothecae* cup-shaped, deep, base curved, abcauline wall 0.20–0.22 mm long, concave; adcauline wall 0.21–0.25 mm long, straight, or with a slight convexity below the margin, both walls thickened, the abcauline flange extending back to the median nematotheca. *Margin* circular, 0.21–0.23 mm in diam., slightly sinuated. *Nematothecae* large, bithalamic, 0.08–0.10 mm long, distal cup 0.05 mm in diam., 3 on the athecate internode—1 median, base stout, cup excavated on adcauline side, 2 laterals below hydrotheca on a very short apophysis of the hydrocladium, cups narrow, excavated on inner side, sides slightly inrolled; 1 on athecate internode, similar to others; 2 similar in shape, but larger than cauline nematothecae on the pedicel of female gonotheca, facing outwards, cups excavated on the side facing gonotheca; 1 nematotheca on male gonotheca above pedicel. *Gonothecae* of both sexes on the one stem, arising beside the median nematotheca on thecate internodes, male small, 0.22–0.27 mm long, ovate, 0.10–0.14 mm wide, only on proximal stem internodes; female large, 0.64–0.66 mm in diam., globular, only on distal internodes; female gonophore of 1 large egg surrounded by a top-shaped blastostyle.

*Remarks:* Although Mulder & Trebilcock describe and figure the hydrotheca of *A. campanuliformis* as campanulate, this is somewhat misleading, as the type specimens as well as the Pearson I. material have almost tubular hydrothecae.

This is the second record of *A. campanuliformis*, and a first record for S. Aust. (Other locality—Vic.)

*Antennella secundaria* (Gmelin) s. sp. *dubiaformis* (Mulder & Trebilcock, 1910).

FIGS. 45, 46

*Plumularia dubiaformis* Mulder & Trebilcock, 1910: 119, pl. 2, fig. 7.

*Antennella secundaria* (Gmelin). Billard, 1913: 8.

*Plumularia secundaria* (Gmelin). Blackburn, 1938: 361.

*Schizotricha secundaria* (Gmelin). Blackburn, 1942: 108.

*Records:* S, 17–27 m, on compound ascidian, *Rhodymenia australis*, *Distromium flabellatum*, *Sertularia unguiculata* and sponge.

*Material:* Abundant fertile colonies. *Hydrothiza* tubular. *Stems* to 6 mm long, perisarc delicate. First stem internode long, athecate, with 3 nematothecae and oblique distal joint. Internode occasionally with 1 branch. Following internodes alternately thecate and athecate,

athecate internodes 0.3 mm long, with an indistinct transverse and a strong oblique distal joint; thecate internodes slightly longer, 0.30–0.35 mm long. *Hydrothecae* campanulate, 0.20–0.22 mm deep, set at an angle of 45° to hydrocladial axis, base flat, abcauline wall slightly thickened, adcauline wall almost entirely adnate, free part closely adpressed to internode. *Margin* entire, delicate, 0.26–0.30 mm in diam. *Nematothecae* as described for *A. secundaria*, 2 present on athecate internode. One small suprathecal nematotheca usually, but not always present in the sinus above the hydrotheca. *Gonothecae*—male and female on the same stem, arising beside the median subhydrothecal nematotheca, tapering to a short pedicel. Female globular, flattened, 0.52–0.58 mm long, widest near middle, 0.40–0.44 mm maximum width, closed by a thin operculum; 3 nematothecae similar to laterals, in basal region. Male gonotheca small, 0.15–0.20 mm long, 0.12–0.13 mm wide, with 1 proximal nematotheca.

*Remarks:* The present specimens are identical with 2 microslides of fragmentary infertile material of *Plumularia dubiaformis* Mulder & Trebilcock in the collection of the NMV. Mulder & Trebilcock, because of poor material, were unable to establish the presence or absence of the suprathecal nematothecae in *P. dubiaformis*. These nematothecae are clearly visible in the Pearson I. material.

I have also compared the present material with fertile material of *A. secundaria* from Mossel Bay, South Africa, provided by Dr. N. A. H. Millard, and with the exception of the 2 median nematothecae on the athecate internode in the Pearson I. specimens (1 in the South African material), the two are indistinguishable. As the number of nematothecae on the athecate internode is not a reliable specific criterion, I agree with Billard (1913) and Blackburn (1938) who suggested *P. dubiaformis* would prove to be a synonym of *A. secundaria*.

As the known South Australian material of *A. secundaria* always has 2 nematothecae on the athecate internode, compared to 1 in the typical form, and has now been recorded from two widely separated localities (Pearson I and Vic.), it is here recognized as a subspecies of *A. secundaria*.

*Halopteris sulcata* (Lamarck, 1816).

*Plumularia sulcata* Lamarck, 1816: 128. Briggs, 1915: 306, pl. 11, fig. 1. Bale, 1914b: 172, pl. 35, figs. 6, 7; 1915: 296.

*Plumularia aglaophenoides* Bale, 1884: 126, pl. 10, fig. 6.



**Records:** R. 30 m, on sandy floor of cavern.  
**Material:** Several large fertile colonies. *Stems* fascicled, branched, to 20 cm high, growing from a small fibrous rootstock. *Colour*—dark brown.

**Remarks:** This species is easily recognizable by its large, erect woody stem, colour, and brittle texture. At Pearson I., *H. sulcata* was found only on the floors of caverns sheltered from surge; it has however also been noted in open water to the east, in Investigator Strait (J.W., unpublished) at depths of 40 m.

***Halopteris campanula* var. *campanula*** (Busk, 1852). Ralph, 1961b:47.

*Plumularia campanula* Busk, 1852: 401. Bale, 1884: 124, pl. 10, fig. 5; 1888: 776; 1913: 133; 1915: 295. Hodgson, 1950: 40, fig. 69.

*Schizotricta campanula* (Busk), Blackburn, 1942: 107.

**Records:** R. 35 m, epilithic.

**Material:** One infertile colony growing from a common rootstock. *Stems* polysiphonic, branched, to 4.5 cm high; some secondary branching. *Colour*—yellow.

**Remarks:** The specimens agree with descriptions of *P. campanula*, and *H. campanula* var. *campanula* of Ralph (1961b).

***Halopteris buski*** (Bale, 1884).

*Plumularia buski* Bale, 1884: 125, pl. 10, fig. 3, pl. 19, figs. 34, 35; 1914a: 28; 1915: 296. Briggs, 1915: 304. Hodgson, 1950: 45, fig. 75. *Schizotricta buski* (Bale), Blackburn, 1942: 107.

**Records:** R. 30–33m, on *Herdmania montus*, bryozoa and sponge; Stn. F. 65 m, on worm tube.

**Material:** Scattered colonies, each of a few stems to 2 cm long. One stem with immature male gonophores.

**Remarks:** The Pearson I. specimens do not differ significantly from descriptions of Bale and Briggs. With one exception (Stn. F) the colonies are all from the exposed side of the island. They are short and robust, with deeply incised stem joints; frequently an extra oblique septal internodal ridge is developed just below the adcauline hydrothecal wall. The stems from less turbulent deeper water (Stn. F) are more flexuous, with indistinct cauline nodes, and also lack the oblique hydrocladial septa present in the shallower water specimens. The deeper water stems were scarlet in colour, whereas the shallower water specimens varied from orange to yellow.

***Halopteris opposita*** (Mulder & Trebilcock, 1911).

FIG. 47

*Plumularia opposita* Mulder & Trebilcock, 1911: 120, pl. 2, fig. 5.

*Theocaulus oppositus* (M. & T.), Blackburn, 1938: 316, fig. 2; 1942: 107.

**Records:** S. 30 m, on *Sargassum spinuligerum* and *S. verruculosum*.

**Material:** Scattered infertile stems to 12 mm long. The specimens compare with the type microslide of *H. opposita* in the collection of the NMV, and allow a fuller description to supplement the previous brief description of Mulder & Trebilcock.

*Stems* with 2–3 indistinct proximal annulations, followed by a long athecate internode with 2–3 nematothecae, then alternate thecate and athecate internodes of approx. the same length, 0.27–0.39 mm; athecate internodes with a proximal transverse joint and strongly oblique distal hinge-joint, and 2–3 nematothecae; if 2, they are one above the other; the third, if present, is beside the distal nematotheca. *Hydrocladia* opposite, arising behind the cauline hydrothecae in middle of the internode, hydrocladia beginning with 2 short athecate internodes, the first internode the shorter, 0.05–0.07 mm long, the second 0.07–0.08 mm long, with a transverse proximal, and an oblique distal joint, and occasionally, 1 nematotheca. Thecate hydrocladial internodes similar to stem internode. *Hydrothecae* campanulate, 2–3 on hydrocladium, 0.15–0.18 mm deep, set at 45° to hydrocladial axis. *Margium* 0.19–0.21 mm diam., slightly sinuated, rim everted, with a peak on the abcauline side. Abcauline wall 0.12–0.15 mm long, in some hydrothecae a small transverse fold near base. *Nematothecae* 0.05–0.07 mm long, 2 suprathecal on stem internodes, 4 on thecate hydrocladial internodes—1 median, stout at base, distal cup cut away on adcauline side, closely adpressed to internode; 2 lateral suprathecal, with slender pedicels, on an apophysis of the internode, extending above hydrotheca, and 1 small nematotheca between laterals at base of hydrotheca. *Hydranth* with 10–16 tentacles, connected to internode by a small orifice in the upcurve of the abcauline wall.

**Remarks:** The stem of the type is thick and robust, and the athecate stem internodes are considerably shorter than the thecate internodes, with deeply constricted nodes.

The Pearson I. specimens have slender stems, and internodes of nearly equal length. Black-



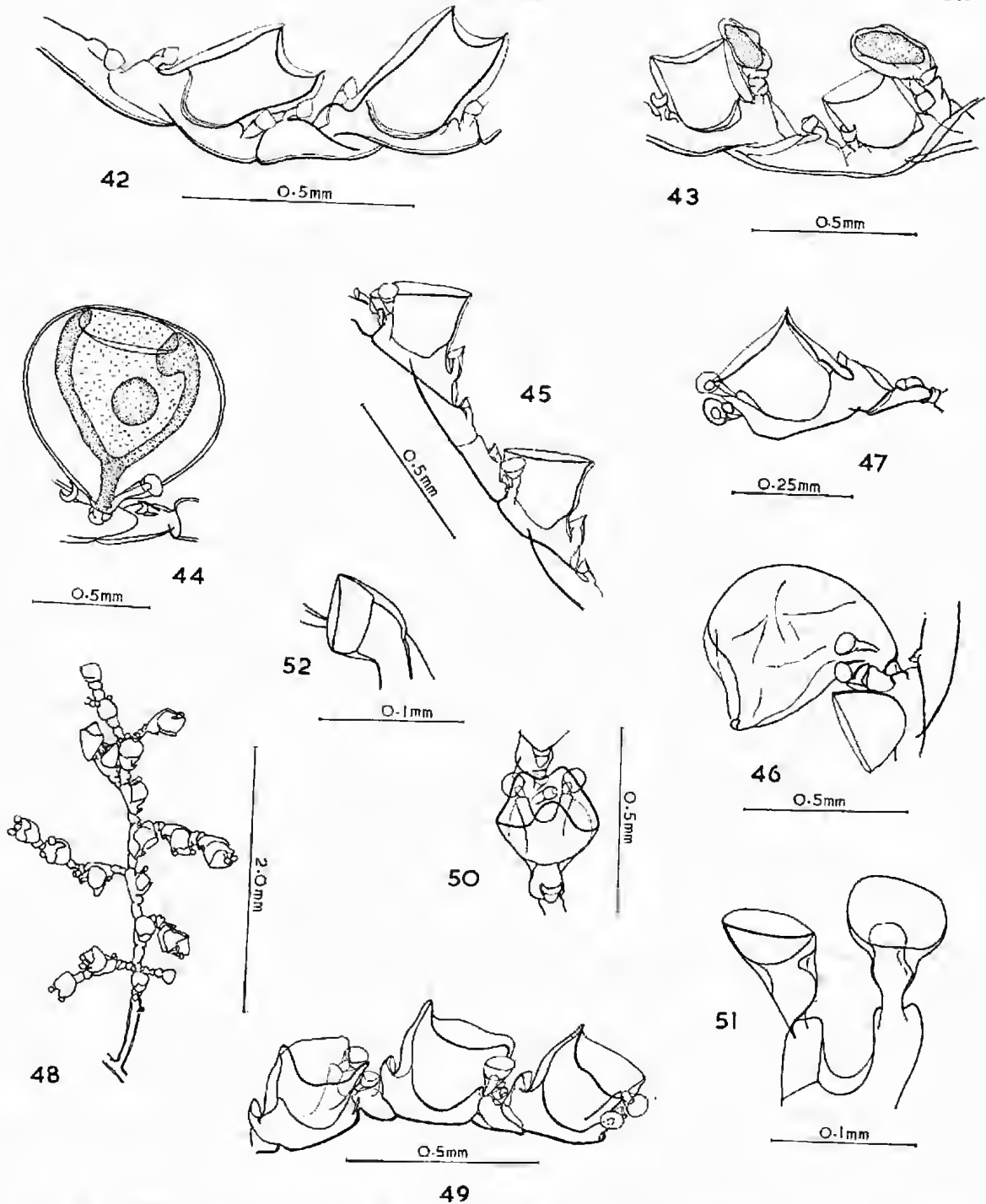


Fig. 42. *Antennella tubulosa* (Bale). Part of stem.  
 Figs. 43, 44. *Antennella campanuliformis* (Mulder & Trebilcock). Fig. 43.—Part of stem with male gonophores. Fig. 44.—Female gonophore.  
 Figs. 45, 46. *Antennella secundaria s.sp. dubiaformis* (Mulder & Trebilcock). Fig. 45.—Part of stem with two hydrothecae. Fig. 46.—Empty female gonotheca.  
 Fig. 47. *Halopteris opposita* (Mulder & Trebilcock). Hydrocladium with one hydrotheca.  
 Figs. 48–52. *Gattya trebilcocki* n.sp. From holotype. Fig. 48.—Whole stem. Fig. 49.—Hydrocladium with three hydrothecae. Fig. 50.—Hydrotheca, anterior view. Fig. 51.—Twin lateral nematothecae from distal end of hydrocladium, enlarged. Fig. 52.—Median nematotheca on thecate internode, enlarged.

burn (1938) also noted this feature in his material from the Sir Joseph Banks Group, and considered that it may "constitute a distinct variety". As the type microslide consists of a single stem fragment 3 mm long, it seems possible that the South Australian material may better represent the species than the type itself.

This is the third record of *H. opposita*. (Other localities—central Vic., Sir Joseph Banks Group, S. Aust.)

***Gattya aglaopheniaformis* (Mulder & Trebilcock, 1909).**

*Plumularia aglaopheniaformis* Mulder & Trebilcock, 1909: 32, pl. 1, fig. 7.

*Halopteris aglaopheniaformis* (M. & T.), Shepherd & Watson, 1970: 140.

**Records:** R, 18–33, on *Plumularia procumbens* and *Callophyllis coccinea*.

**Material:** Several colonies of a few infertile stems each. *Hydrorhiza* tubular. *Stems* to 7 mm long, beginning with an athecate internode with 1–3 pairs of cauline nematothecae; thecate internodes with a proximal hydrotheca, and 2 pairs of suprathecal nematothecae. Hydrocladia arising from a small apophysis behind hydrotheca, the first pair opposite, first 2 hydrocladial internodes slender, short, athecate, 0.04–0.06 mm long, with transverse joints, distal internode longer, 0.07–0.09 mm, with 1 median nematotheca. *Hydrothecae* 0.17–0.20 mm deep (lateral view), with broadly lobed margin 0.13–0.18 mm in diam., the anterior and posterior lateral projections curving inwards over the aperture.

**Remarks:** The marginal projections of the Pearson I. specimens differ from those of *P. aglaopheniaformis* figured by Mulder & Trebilcock. Furthermore, the cauline internodes are variable in length, some being barely long enough to accommodate the hydrotheca; those stems with longer internodes also have a thin perisarc, are more flexuous, and have a less deeply lobed hydrothecal margin than the type.

Following Millard (1962, p. 270), this and other species with a toothed thecal margin are referred to *Gattya*.

***Gattya balei* (Bartlett, 1907).**

*Plumularia balei* Bartlett, 1907: 65, Mulder & Trebilcock, 1909: 29, pl. 1, figs. 1–3. Hale, 1919: 344, pl. 17, fig. 6.

**Records:** R, 14–45 m on *Metamastophora flabellata*, *Pterocladia lucida* and *Pterosphonia*?

**Material:** Colonies common. A few fertile stems with female gonophores. *Stems* to 7 mm long.

**Colour**—yellow.

**Remarks:** This rare but distinctive species has not been recorded previously in S. Aust. (Other locality—central Vic.)

***Gattya trebilcocki* n.sp.**

**FIGS. 48–52.**

**Type Material and Records:** Holotype, NMV G2029, microslide, G2099, preserved material, remainder of holotype colony—R, 10–33 m, on fragment of *Caulerpa brownii*; paratypes, G2030, G2031, G2032, G2033, G2034, G2035; SAM H39, microslides—R, 10–33 m, on *Caulerpa brownii*; G2100, preserved material, remainder of paratype colonies.

**Description from holotype and paratypes:** *Hydrorhiza* tubular, of same diam. as stem, embedded in the stem of the alga. *Stems* to 5 mm long, proximal stem internode 0.70–0.75 mm long, athecate, perisarc thick, with a few rough annular constrictions, and 1–2 distal nematothecae; distal hinge joint V-shaped. Following stem internodes alternately thecate and athecate, thecate internodes 0.25–0.45 mm long, athecate internodes 0.10–0.13 mm long, average diam. of internode 0.10 mm. *Hydrocladia* arising from a short apophysis of the stem above the hydrotheca on each cauline internode, first pair opposite, following hydrocladia alternate. Hydrocladium with 1–3 hydrothecae, thecate and athecate internodes alternate, crowded, identical to cauline internodes. Athecate internodes very short, 0.04–0.06 mm long, 2 between hydrocladial apophysis and first thecate internode, distal joint oblique, the second internode with oblique distal node, and 1 median nematotheca; following internodes alternately athecate and thecate, athecate internodes 0.07–0.08 mm long, thecate internodes 0.21–0.29 mm long, with oblique proximal and transverse distal nodes. *Hydrothecae* distal on internode, cup-shaped, 0.14–0.20 mm deep, perisarc delicate, base curved, set well down in hydrocladium; abcauline wall 0.15–0.20 mm long, convex, thickened to base of median nematotheca; adcauline wall shorter, 0.12–0.17 mm long (to end of lobes) not thickened, almost straight. *Margin* sinuated, 0.20–0.25 mm in diam., with 5 lobes of which 3 are well developed, tongue-shaped—1 anterior, peaked, rising over aperture, 2 posterior, paired, with a deep sinus between, and 2, paired, in middle of margin, broad and low in lateral view, but often obscure. *Nematothecae* bihthalmic, of 3 types—1 median, on each athecate internode (except

first hydrocladial internode), base slender, distal cup deep and rather narrow; 4 nematothecae on thecate internodes—1 median, base very stout, 0.08–0.10 mm long, distal cup excavated on adcauline side, cup 0.04–0.06 mm in diam., margin vertical, closely adpressed to hydrocladium; 2 posterior laterals, longer than medians, 0.08–0.10 mm long, distal cup wide and shallow, 0.05–0.08 mm in diam., slightly flattened on adcauline side, overtopping marginal lobe of hydrotheca, base slender, on a pedicel 0.06–0.08 mm long; 1 small median suprathecal, similar to nematothecae on athecate internodes, but smaller, deeply set between the twin laterals at base of hydrotheca. *Hydranth* with approx. 16 tentacles. Colour—pale yellow. *Gonotheca* absent.

**Remarks:** *G. trebilcocki* shows close affinity with *G. aglaopheniaformis* Mulder & Trebilcock, but may be easily distinguished from this species by the shape of the posterior marginal lobes of the hydrotheca, which in *G. trebilcocki* are rounded. The cups of the lateral nematothecae are also much larger in *G. trebilcocki*.

Both species occur in the same locality and over a similar depth range, but *G. aglaopheniaformis* as presently known is an epizoic species, whereas *G. trebilcocki* has been found only on algal substrate. Both species are rare.

***Plumularia procumbens*** Spencer, 1891: 130, pls. 21–23, figs. 17–25. Bale, 1894: 115, pl. 5, figs. 11, 12; 1914a: 29; 1915: 297, Briggs, 1915: 305, pl. 10, fig. 1.

**Records:** R, 33 m, epilithic on vertical rock faces.

**Material:** One infertile colony 7.5 cm high. *Stem* thick, fascicled, growing from a fibrous rootstock. Short hydrocladial internodes with nematothecae as described by Bale (1914a) and Briggs (1915).

**Remarks:** Although only 1 specimen was collected, several mature colonies of similar size and appearance were noted. The colonies are small in comparison with Briggs' Tasmanian material and Spencer's material from Port Phillip Bay, Vic. Bale (1914a, 1915) does not give dimensions of *P. procumbens* from the Great Australian Bight.

***Plumularia asymmetrica*** Bale, 1914a: 29, pl. 4, figs. 2, 3; 1915: 279.

FIG. 53

**Records:** Sn. F, 65 m, freegrowing on sandy bottom.

**Material:** One infertile colony, 30 cm high.

*Stem* long, flexuous, branched, strongly fascicled near base. *Hydrocladia* with 12–15 hydrothecae, hydrocladial internodes with 5–7 strong septal ridges. *Hydrothecae* long, adnate, abcauline wall curving over distally towards hydrocladium; an indistinct intrathecal fold sometimes present about halfway along thecal wall. *Margin* with 2 broad bluntly pointed lateral lobes, usually of the same size and shape, occasionally 1 lobe much more prominent than the other.

**Remarks:** The Pearson I. material shows some variations compared with Bale's microslides of 'Endeavour' material from the Great Australian Bight in the collection of the NMV. The 'Endeavour' specimens show considerably more curvature of the distal hydrothecal abcauline wall than the Pearson I. material, have a distinct oblique intrathecal ridge, and a maximum of 4 septal ridges in the internode. The marginal lobes of the 'Endeavour' specimens seldom show the pronounced degree of asymmetry inferred from Bale's figures of *P. asymmetrica*. Furthermore, the margins of the lobes are rounded, rather than pointed, and each pair is usually the same shape; however, as the hydrothecal margin itself is slightly oblique to the hydrocladial axis, the lobes appear asymmetrical when viewed from above.

*P. asymmetrica* shows a strong resemblance to figures and description of *P. hertwigi* Stechow, 1909 from Japan (Bale 1914a, p. 31) and *P. habereri* var. *elongata* Billard, 1913 from the Indo-Pacific region. The latter is a small species 2–3 cm high, and the hydrocladial internodes and hydrothecae appear to be indistinguishable from *P. asymmetrica* from Pearson I. The less distinct intrathecal fold and more symmetrical marginal lobes of the Pearson I. specimens tends to bridge the gap between *P. asymmetrica* and *P. hertwigi*. Possibly all are geographical variants of the one species.

Although only 1 colony was collected, the species was a dominant member of the seafloor community of the deeper water. Many of the older colonies were almost completely invested by a growth of a pink coloured epizoic zoanthid, the weight of which bends the colonies over to touch the sand.

This is the fourth record of *P. asymmetrica*; other records are also from the Great Australian Bight.

***Plumularia flexuosa*** Bale, 1894: 115, pl. 5, figs. 6–10. Mulder & Trebilcock, 1916: 78 (discussion). Stechow, 1925: 246. Black-

burn, 1938: 315. Shepherd & Watson, 1970: 140.

*Plumularia pulchella* (Bale). Totton, 1930: 221, fig. 58.

**Records:** R, 27–45 m, on *Mychoden carnosus*. **Material:** A few infertile stems. Stems to 3 mm long; internodes long, flexuous, nodes transverse, 3 cauline nematothecae on an internode — 2 axillar, and 1 proximal, exactly as described and figured by Bale (1894) for *P. flexuosa*.

**Remarks:** I have examined a series of microslides of *P. pulchella* Bale, 1882, and *P. flexuosa* in the Bale collection of the NMV. The stems of *P. pulchella* are robust, with several transverse cauline internodal septa, but have no cauline nematothecae. Hydrocladia and hydrothecae are identical in both species.

The gonotheca of *P. pulchella* is globular, with an oblique aperture, and a row of large internal submarginal teeth. In *P. flexuosa*, the gonotheca is elongate, twice as long as wide, and there are no submarginal teeth.

Although Bale (1894) clearly distinguished between the two species, Totton (1930) united them in *P. pulchella* on the grounds that "*P. flexuosa* . . . appears to fall well within the range of variation of this species" (i.e. *P. pulchella*) as the stems of some of his material were "fine and flexuous, while others were stout and straight". His synonymy has since been followed by Ralph (1961b) and Millard (1957).

Stem thickness and the presence or absence of cauline nematothecae are frequently unreliable specific criteria among the Plumulariinae, but taking into account the difference between the gonothecae (unless sexual dimorphism can be demonstrated) it seems best, following Blackburn (1938), to regard the two as distinct species.

Although associated with a range of algal substrates in other localities (J.W. unpublished) *P. flexuosa* occurred only associated with a delicate species of the red algal genus *Mychodea* (usually placed under *M. carnosus* in herbaria). The growth habit of the hydroid is unusual and was first noticed by Dr. H. B. S. Womersley and G. T. Kraft who supplied the following description: "The hydroid infests the *Mychodea* fronds from a very early stage, with fronds less than 1 cm high showing abundant hydroid stolons. The stolons penetrate lengthwise through the outer medulla of the alga, branching occasionally laterally, and producing at regular intervals through the cortex the erect,

polyp-bearing axes. As the *Mychodea* plant develops, proliferation of the hydroid stolons in the lower axis breaks down the algal tissue until the *Mychodea* is attached to the substrate only by a dense web of hydroid. This may be 2–8 mm thick and a centimetre or more long, supporting a much branched *Mychodea* plant over 20 cm long and infested throughout with the hydroid."

**Plumularia spinulosa** Bale, 1882: 42, pl. 15, fig. 8; 1884: 139, pl. 12, figs. 11, 12; 1888: 783. Stechow, 1925: 246. Millard, 1962: 301.

FIGS. 54, 55

*Plumularia spinulosa* var. *spinulosa* Ralph, 1961: 37, fig. 4. Shepherd & Watson, 1970: 140.

**Records:** R, 18–30 m, on *Laurencia elata*, *Plocamium angustum*, *Thyroscyphus marginatus* and *Aglaophenia plumosa*.

**Material:** Abundant infertile colonies of a few stems each. *Hydrorhiza* wide and flat with transverse dark markings. Stems to 3 mm long, internodes of variable length, 0.17–0.21 mm, width at node 0.02–0.04 mm. *Hydrocladia* arising near middle of short internodes, distally on long internodes. *Hydrothecae* 0.16–0.18 mm deep, abcauline wall strongly convex. Terminal hydrocladial spines well developed, varying from long and sharply pointed to blunt and barely protruding past hydrothecal margin. *Nematothecae* identical with typical form, but pedicels of the median hydrocladial nematothecae show considerable variation in thickness.

**Remarks:** The Pearson I. material shows a wide variation in size of the stem internodes, position of the hydrocladial apophyses, width of the nematothecal pedicels and length of the terminal spine. Those hydrothecae with more pronounced terminal spines are always larger and more robust in appearance than those with the shorter spines. Because of the variability of length of the terminal spine, Millard (1961) no longer recognizes the distinction between the varieties of *P. spinulosa* (i.e. var. *typica* Stechow, 1923 — var. *spinulosa* Ralph, 1961b, and var. *obtusum* Stechow, 1923). The present material supports her view.

No correlation was evident between stem type, substrate, or environmental conditions.

**Plumularia goldsteini** Bale, 1882: 41, pl. 15, fig. 7; 1884: 137, pl. 11, fig. 9.

**Records:** R, 30 m, on *Delisca pulchra*.

**Material:** A few infertile stems to 3 mm long.

**Remarks:** The specimens conform exactly to the description of *P. goldsteini* by Bale.



A new record for S. Aust. (Other locality—Vic.)

**Plumularia obliqua** (Johnston, 1847). Bale, 1884: 138, pl. 12, figs. 1–3; Blackburn, 1942: 108.

*Laomedea obliqua* Johnston, 1847: 106, pl. 28, fig. 1.

*Records:* R, 20 m, on *Metanastophora flabellata*; S, 30 m, on *Sargassum* sp.

*Material:* A few delicate infertile stems to 4 mm long.

*Remarks:* The material conforms to descriptions of *P. obliqua* by Bale.

**Plumularia australis** Kirchenpauer, 1876. Bale, 1884: 143, pl. 12, figs. 6, 7, pl. 19, figs. 43, 44.

*Plumularia obliqua* var. *australis* Kirchenpauer, 1876: 49, pl. 6, fig. 10.

*Records:* S, 14 m, on the seagrass *Posidonia australis*.

*Material:* Luxuriant infertile colonies. Stems to 4 mm long, arising from a broad flat hydro-rhiza with transverse dark markings.

*Remarks:* The Pearson I. material compares with Bale's (1884) description of *P. australis*. The median nematothecae are, however, not as deeply excavated on the adcauline side nor as closely adpressed to the hydrocladium as in his figures. The axillar monothalamic nematothecae are absent from many stems.

**Plumularia epibracteolosa** n.sp.

FIGS. 56–60

*Type Material and Records:* Holotype, NMV G2046, microslide; G2101 preserved material, remainder of holotype colony; paratypes, G2047, G2048, G2049, G2050, G2051; SAM H37, microslides; all material—R, 50 m, on *Sargassum bracteolosum*.

*Description from holotype and paratypes:* *Hydro-rhiza* flat, reticular, 0.25 mm wide, with pegged borders, radiating from a digitate stolonial plate. *Stems* monosiphonic, to 2 cm long, perisarc thick; proximal internodes roughly undulated, without hydrocladia, nodes indistinct, following internodes hydrocladial, 0.36–0.45 mm long, 0.14–0.15 mm in diam., proximal and distal nodes oblique, V-shaped. *Perisarc* smooth externally, internally ridged by 3–4 internodal septa—1 above, and 1 below node, 1–2 in middle of internode, ridges fewer in younger parts of stem; either absent or incipiently developed in younger stems. *Hydro-cladia* alternate, 1 on each stem internode, in 1 plane, arising from a short distal apophysis of

the stem. One or two hydrothecae on hydro-cladium: hydrocladium beginning with 1, occasionally 2, short proximal athecate internodes 0.09–0.12 mm long, proximal node transverse, distal node slightly oblique; thecate internode 0.23–0.27 mm long, socketted into the athecate internode by a slender joint; hydrocladia below internode straight, blunt end not projecting beyond thecal margin; 4–5 oblique internodal septa dividing internode into segments, 2 below median nematotheca, sloping opposite ways, and 2 below the hydrotheca. When 2 hydrothecae are present on hydrocladium, they are separated by 2 athecate internodes, the first short, 0.07–0.09 mm long, with transverse joints, the next 0.12–0.16 mm long, with a socketted proximal and an oblique distal joint and 1 median nematotheca; both internodes without septa. *Hydrothecae* wide, shallow, cup-shaped, 0.15–0.17 mm deep, with a flat base, set on the 3 strong convexities of the hydro-cladium; abcauline wall straight, 0.11–0.13 mm long, thickened by a continuous flange of perisarc extending the entire length of the thecate internode; adcauline wall 0.10–0.11 mm long, slightly convex, adnate to hydrocladium only near base, the remainder joined to the hydro-cladium by a wedge of perisarc. *Margin* 0.14–0.19 mm in diam. (lateral view), sinuated, with a thickened outwardly rolled rim, the line of the margin curved down to meet the hydro-cladium, but the aperture truncated by a delicate transverse sheet of perisarc extending across the cup 0.05 mm above adcauline wall. *Nematothecae* all of similar shape and size, 0.06–0.09 mm long, bithalamic, distal cups shallow, entire, 0.03–0.04 mm in diam.; 2 cauline with slender bases, 1 in middle of stem internode, often missing, and 1 axillar; 3 on thecate hydrocladial internodes—1, median, base stout, cup slightly excavated on adcauline side, 2 laterals below the hydrotheca, bases stout, cups narrow, standing upright on hydro-cladium but not reaching top of transverse perisarc web. One minute mamilliform pore present on the shoulder of the hydrocladial apophysis. *Hydranth* with approx. 24 tentacles. *Gonothecae* large, 1–2 on lower stem on a short pedicel arising from an old hydrocladial apophysis, elongate oval, 1.38–1.8 mm long (including pedicel) maximum diam. 0.72–1.02 mm (at two-thirds the distance up from pedicel) perisarc delicate, smooth, or slightly undulated, no operculum, top closed by a thin convex membrane. Gonophores male, mature, surrounded by a thin blastostyle. *Colour*—stems bright yellow, gonothecae orange.

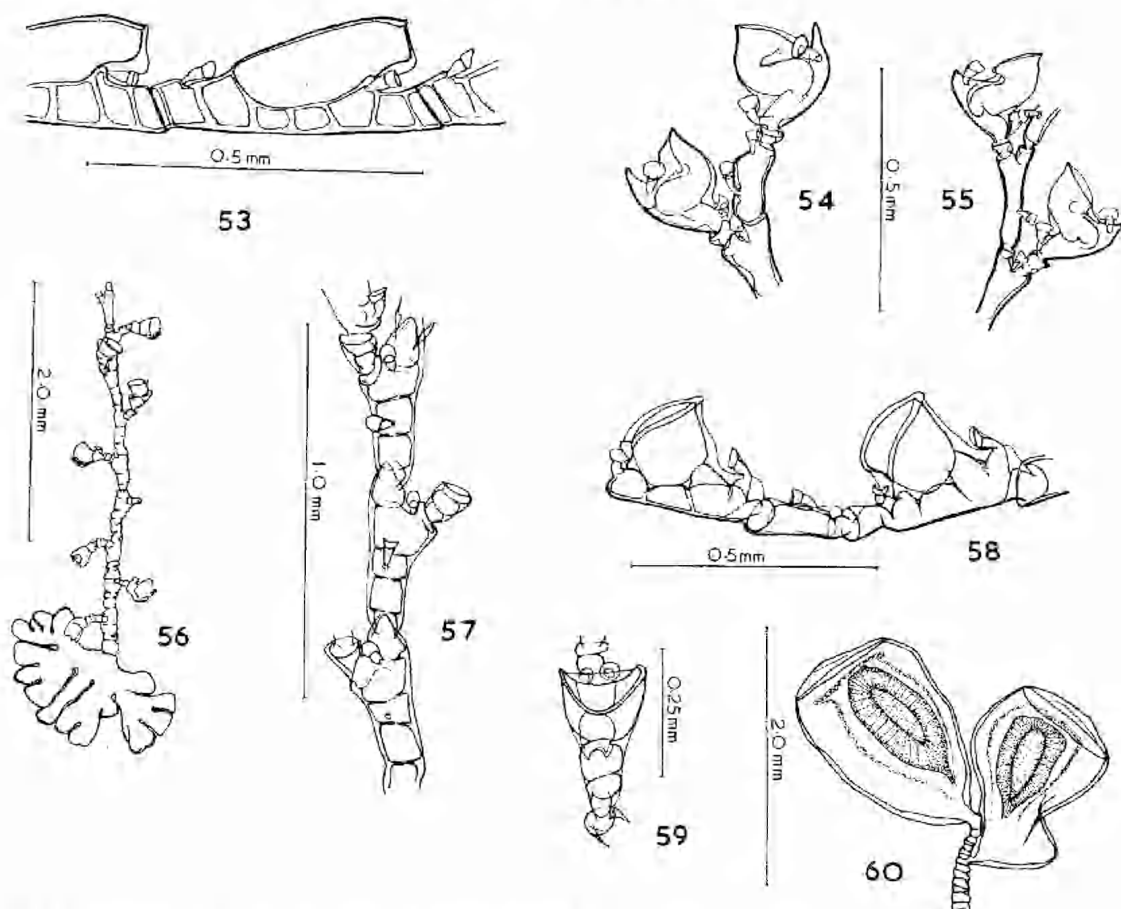


Fig. 53. *Plumularia asymmetrica* Bale. Part of hydrocladium with two hydrothecae.  
 Figs. 54, 55. *Plumularia spinulosa* Bale. Fig. 54.—Part of a stem with larger hydrothecae and prominent terminal spines. Fig. 55.—Stem with smaller hydrothecae and blunt spines.  
 Figs. 56–60. *Plumularia epibracteolosa* n.sp. Fig. 56.—Whole stem with stolonial plate. Fig. 57.—Part of stem showing internodal septa and cauline nematocyst. Fig. 58.—Hydrocladium with two hydrothecae. Fig. 59.—Hydrotheca, dorsal view. (Figs. 56–59 drawn from holotype). Fig. 60.—Group of two male gonophores, from paratype.

**Remarks:** *P. epibracteolosa* is closely allied to the *P. setaceoides* group endemic to Australia and New Zealand. It shows some affinities with *P. excavata* Mulder & Trebilcock, and with *P. corrugatissima* Mulder & Trebilcock, but is easily distinguished from both these species by the structure of the hydrotheca and from *P. corrugatissima* by its greater overall size. Stolonial reproduction, common among some species of the Plumulariinae, has been discussed by Billard (1904) and Gravier (1971) but has not previously been reported among the Australian members of the subfamily. Many stems of *P. epibracteolosa* show various stages of distal elongation into a tendril which flattens out laterally into an embryonic stolonial plate. This plate adheres to the edge of a nearby algal

frond, sending out hydrorhizal filaments to form a new colony, the parent stem finally breaking away. In one case (holotype microslide) a stem has re-attached itself by the distal end to the same stolonial plate, forming a closed loop.

*P. epibracteolosa* exhibits extreme variation in development of the cauline internodal septa. The older stems, distinguished by the thicker perisarc, are heavily internally ridged, while the younger stems have either none at all or show a gradational development between the two extremes. The presence of internodal septa has often been accepted as a diagnostic character within the Plumulariinae, but the variability of *P. epibracteolosa* demonstrates the unreliability of this criterion.

The fronds of the substrate alga *Sargassum bracteolum* are seasonal, growing from September to February (Shepherd & Womersley 1970). *P. epibracteolosa* must therefore spread very rapidly in order to form fertile colonies within a very short period. This may account for the unusual propagation of the colonies by both normal growth and stolonial reproduction, the latter method ensuring spread of the colonies from one part of an alga to another.

Although the alga, *S. bracteolum*, is also very common at West I. (Shepherd & Womersley 1970), *P. epibracteolosa* was never recorded from this locality. At Pearson I., the alga was restricted to a limestone seafloor in moderate surge at a depth of 50 m, at a distance of 400 m offshore. The colonies of *P. epibracteolosa* occur only on the fronds, whereas *Amphisberia minima* var. *pumiloides* Bale exclusively epiphytises the harder stems of the alga.

***Plumularia meretricia* n.sp.**

FIGS. 61–64

*Type Material and Records:* Holotype, NMV G2053, microslide; G2102, preserved material, remainder of holotype colony—R, 27–30 m, on sponge on vertical walls; paratypes, G2054, G2055, G2056, G2057, G2058, G2059, SAM H38, microslides; G2103, G2104, preserved material, remainder of paratype colonies—S, 18 m, on sponge on rock walls.

*Description from holotype and paratypes:* *Hydrorhiza* tubular. Stems monosiphonic, erect, straight, to 15 mm long; stem internodes 0.42–0.51 mm long, smooth, the proximal internode beginning with a transverse joint near base of stem, following internodes with an oblique proximal joint, often indistinct, and a strong distal joint, 0.06–0.09 mm in diam. *Hydrocladia* alternate, 1 on each internode, widely spaced, arising from a distal apophysis 0.05 mm long, and 0.08 mm in diam. at extremity of internode, with 1, occasionally 2 hydrothecae, and rarely, a secondary branch given off behind the first hydrotheca. Hydrocladium with either 1 long smooth proximal athecate internode 0.14–0.19 mm long, and 0.07 mm in diam., or alternatively, 2–3 short athecate internodes 0.05–0.12 mm long, with internally ridged perisarc. These are followed by a long thecate internode 0.30 mm long, entirely occupied by hydrotheca and an infrathecal chamber 0.10 mm long, terminating behind hydrothecal margin. *Hydrothecae* campanulate, 0.15 mm deep, at 40° to hydrocladial axis; adcauline

wall rounded in lateral view, almost entirely adnate and immersed in internode, abcauline wall straight, expanding, contiguous with line of upper wall of hydrocladium, very slightly constricted behind margin. Margin everted, 0.18 mm in diam., slightly sinuated, curving down and back to adcauline wall. *Nematothecae* bithalamic with slender bases and shallow distal cups partially cut away on the abcauline side, occasionally 1–2 halfway up stem internode on opposite side to hydrocladium, and 1 axillar; 3 present on thecate internode—1 median, 0.04–0.06 mm long, addressed to the infrathecal chamber, and 2 laterals below hydrotheca, 0.03–0.04 mm long, distal cup entire. One very prominent monothalamic mamilliform pore, with 1, sometimes 2 orifices on short tubular necks projecting from the top of the stem apophysis. *Gonotheca* absent.

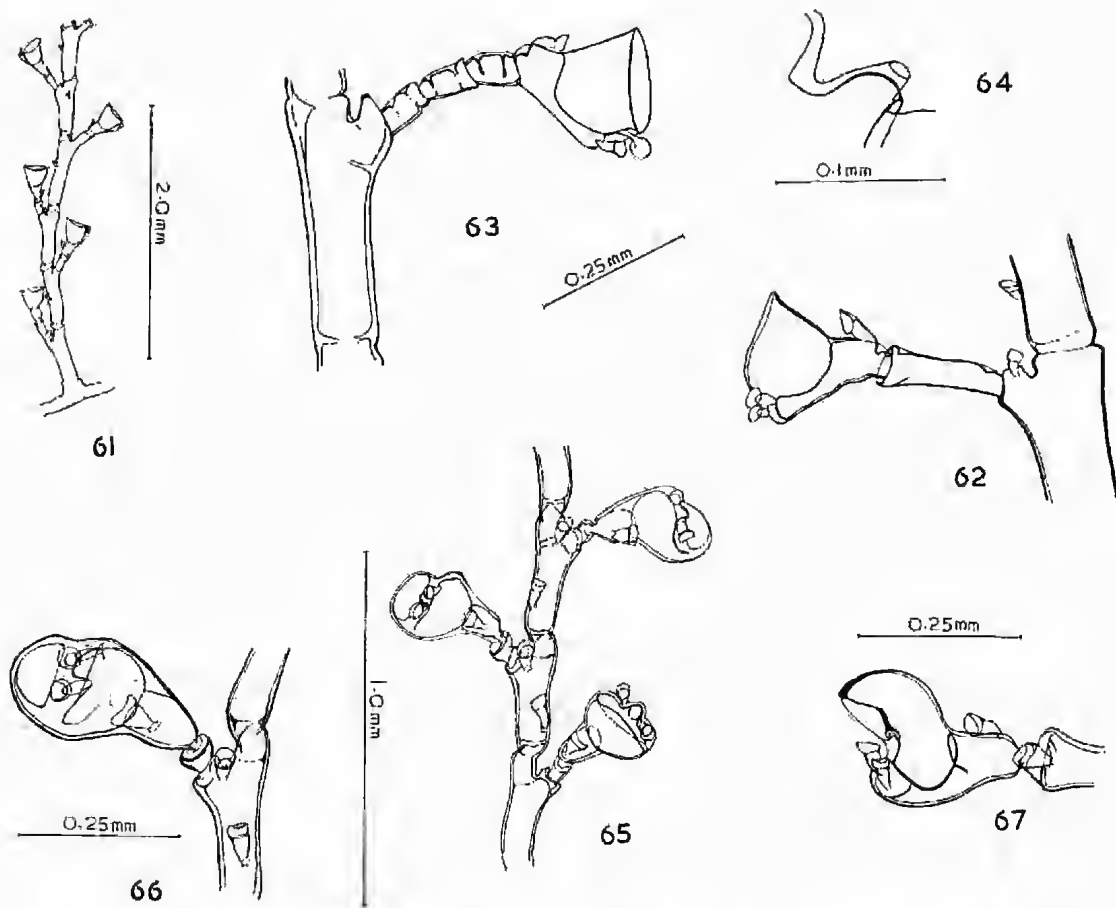
*Remarks:* *P. meretricia*, like *P. epibracteolosa*, shows considerable variability of features usually regarded as reliable specific criteria among the Plumulariinae. The younger stems have a smooth glassy appearance, with long stem and hydrocladial internodes, and also have cauline nematothecae. The stems seldom retain their cauline nematothecae after maturity, showing only scars where the nematothecae have dropped off. Since many of the younger stems show neither scars nor nematothecae, and in some cases, the axillar nematothecae have failed to develop as well, the presence or absence of these structures cannot be regarded as diagnostic of the species. The mamilliform pore is however, a constant feature of all the stems. The regenerated athecate hydrocladial internodes common in some stems, mark the site of repeated breakage and regrowth of the hydrocladium. In these cases, a short athecate internode is first added, followed by an embryonic hydrotheca and infrathecal chamber. Nematothecae bud off later as the hydrotheca nears maturity. The athecate internode at this stage is without internal perisarc ridges. These develop as the hydrocladium ages.

*P. meretricia* shows some relationship with *P. flexuosa* Bale and *P. hyalina* Bale, but it is much larger and more robust than either of these species.

***Plumularia togata* n.sp.**

FIGS. 65–67

*Type Material and Records:* Holotype, NMV G2060, microslide—R, 33 m, on *Metagoniolithon charoides*; paratypes, G2061, G2062, G2063, G2064, G2065, G2066, SAM H40,



Figs. 61–64. *Plumularia meretricia* n.sp. From holotype. Fig. 61.—Whole stem. Fig. 62.—Part of stem with young hydrocladium and smooth athecate internode. Fig. 63.—Older hydrocladium with regenerated athecate internodes. Fig. 64.—Manuilliform axillar nematotheca, enlarged.

Figs. 65–67. *Plumularia togata* n.sp. From holotype. Fig. 65.—Part of stem. Fig. 66.—Hydrocladium and hydrotheca, lateral view. Fig. 67.—Hydrotheca, anterior view, showing aperture.

microslides, G2105 preserved material, remainder of paratype colonies—S, 30 m, on *Metagonialithon charoides*.

*Description from holotype and paratypes:* *Hydrorhiza* broad and flat with transverse dark markings. *Stems* short, to 4 mm long, monosiphonic, flexuous; 1–3 short proximal internodes with transverse nodes, following internodes hydrocladial, longer, 0.03 mm long, 0.08 mm maximum diam., smooth, proximal node transverse, distal node V-shaped, a strong transverse septum above the node. *Hydrocladia* short, alternate, 1 on each internode, arising from a distal apophysis, with 1 very short proximal athecate internode 0.03–0.04 mm long, followed by a longer athecate internode 0.19–0.21 mm long, curving very slightly below

base of hydrotheca. *Hydrothecae* subglobular, 0.20–0.22 mm high from base to crest (lateral view), 0.16–0.18 mm wide (front view). abcauline wall rising perpendicular to hydrocladial axis, then curving over and back to thecal margin; adcauline wall rounded, set well into hydrocladium, free part rising in a sinuous curve to the margin. Infrathecal chamber 0.11–0.13 mm long, maximum width 0.10–0.12 mm, the proximal joint slenderly pointed and socketted into the athecate internode. *Nematothecae* bithalamic, with slender bases, terminal cups wide, a little cut away on adcauline side; 2 cauline—1 axillar, 0.07 mm long, and 1, same as axillar, one third distance up internode, on opposite side to hydrocladium; 3 hydrocladial nematothecae, 1 median, 0.05 mm long,



adpressed to the infrathecal chamber, 2, slightly smaller, standing upright on a projection of the hydrocladium below hydrotheca, barely reaching thecal margin, and separated at the base by a rounded prominence of the hydrocladium. *Gonotheca* absent.

*Remarks:* *P. togata* is a very small species closely allied to *P. hyalina* Bale, from which it may be distinguished by its smaller size, the 2 cauline nematothecae, greater curvature of the abcauline hydrothecal wall and the distinctively hooded appearance of the margin.

***Plumularia australiensis* n.sp.**

FIGS. 68-71

*Type Material and Records:* Holotype, NMV G2067, microslide, G2106 preserved material, remainder of holotype colony—R. 20-25 m on sponge; paratypes, G2068, G2069, G2070, G2071, SAM H41, microslides—R. 20-25 m, on sponge.

*Description from holotype and paratypes:* *Hydrorhiza* tubular, embedded in surface of sponge. *Stem* monosiphonic, flexuous, to 15 mm long, perisarc thick, occasionally heavily thickened at point of regeneration of a new stem from the broken butt of an old stem. Internodes variable in length, 0.06-1.5 mm, nodes transverse, distinct, width at node 0.14-0.25 mm, proximal 2-4 internodes without hydrocladia. Internodes with 6-12 cauline nematothecae scattered in 2 vertical rows in the same plane as hydrocladia; axillar nematothecae absent, but 1 nematotheca usually present on internode just above hydrocladial apophysis; older internodes with fewer nematothecae. *Hydrocladia* to 2 mm long, alternate to subopposite (exceptionally, lower hydrocladia may be opposite) directed upwards in 1 plane from a short apophysis of the stem; 1-3 hydrocladia on internode, arising near top, middle, or base of internode, but this is variable; shorter internodes have fewer hydrocladia. Hydrocladial internodes alternately athecate and thecate, the proximal athecate internode with 1, occasionally 2 nematothecae; following athecate internodes 0.27-0.32 mm long (measured along base of hydrocladium) with a transverse proximal, and strongly oblique distal joint, and 2 nematothecae. Thecate internodes 0.18-0.20 mm long, 0.06-0.08 mm in diam. at transverse (distal) node, a maximum of 7 thecate internodes on a hydrocladium, and frequently, a transverse intermodal septum below pedicel of lateral nematotheca. Thecate internode with 4 nematothecae—1

median, subhydrothecal, 2 lateral, and 1 suprathecal. *Hydrothecae* asymmetrical in lateral view, wider than deep, scoop-shaped, set at about 45° to the hydrocladial axis, abcauline wall straight or very slightly concave and a little thickened, 0.16-0.20 mm long; adcauline wall convex, 0.13-0.19 mm long, the shallow curve of the wall contiguous with the base of the hydrotheca. *Margin* 0.25-0.31 mm in diam., entire, delicate, at an angle of 30° to the hydrocladial axis. *Nematothecae* bithalamic, all of similar shape and size, the cauline nematothecae with moderately slender bases, cups shallow, adcauline wall excavated; 2 median nematothecae on athecate internode, similar to cauline nematothecae, 0.07-0.08 mm long, but with more robust bases, closely adpressed to internode, the proximal nematothecae frequently somewhat smaller than the distal. Thecate internode with 1 median subhydrothecal nematotheca, cup deeply excavated, pressed close to base of thecal wall; 2 laterals with shallow open cups 0.05-0.06 mm in diam., slightly cut away on adcauline side, the edge of cup not reaching thecal margin, base slender, seated on a pedicel 0.05-0.06 mm long, arising at the junction of the adcauline wall with internode; 1 small leaf shaped monothalamic suprathecal nematotheca, set deep in sinus behind hydrotheca, the aperture facing inwards. *Gonothecae* present, male and female arising beside median subhydrothecal nematotheca, usually in proximal region of hydrocladium, sexes usually separate, occasionally both sexes present on same hydrocladium. Female gonotheca pear shaped, 0.18-0.25 mm long (excluding pedicel) 0.42-0.55 mm maximum width, with 1-2 nematothecae in the basal region similar to the laterals, but larger. Operculum a thin flap of same size as top of gonotheca. Male gonotheca smaller than female, slipper-shaped, 0.13-0.16 mm wide, with 1 proximal nematotheca, a little smaller than those on female gonotheca. No operculum. Pedicel a small round segment 0.07 mm in diam. in both sexes.

*Remarks:* *P. australiensis* is closely related to *P. hedoti* Billard from the Indo-Pacific and *P. wasini* Jarvis from South and East Africa, but is distinguished from both these species by the shallow scoop-shaped hydrothecae. It also shows some affinities with some Indo-Pacific members of the genus *Halopteris*, e.g. *H. buski* (Bale) (a deeper water species common on the southern Australian coastline, also found at Pearson I.), and with *H. polymorpha* (Billard) in size and shape of the gonothecae and nema-

tothecae, general aspect of the colonies, and the tendency toward opposite branching in the basal stem region.

***Aglaophenia plumosa*** Bale, 1882: 37, pl. 14, fig. 6; 1884: 153, pl. 14, fig. 5, pl. 17, fig. 12. Blackburn, 1942: 110. Stechow, 1925: 260. Ralph, 1961b: 65, fig. 9. Shepherd & Watson, 1970: 140.

**Records:** R, 24–33 m, on ascidians, bryozoa, and *Carpopeltis phyllophora*.

**Material:** Sparse infertile colonies. *Stems* to 1 cm long.

**Remarks:** The stems are short, with closely set hydrocladia and robust hydrothecae, features characteristic in this species, of an ocean environment.

***Thecocarpus divaricatus*** (Busk) var. ***maccovi*** (Bale, 1884: 162, pl. 15, fig. 7, pl. 17, fig. 7); 1915: 312, pl. 1.

*Aglaophenia maccovi* Bale, 1882: 36, pl. 14, fig. 2. Blackburn, 1942: 110.

*Thecocarpus divaricatus* (Busk). Shepherd & Watson, 1970: 140.

**Records:** R, 23–45 m; S, 4–12 m, on *Metagoniolithon charoides*, *Plocamium cartilagineum*, *Acrocarpia paniculata* and *Zonaria spiralis*.

**Material:** Luxuriant fertile colonies. *Stems* short, to 4 cm long, given off in groups from a winding hydrocladia. Proximal region of stem without hydrocladia, lightly fascicled, some of the supplementary tubes running up the main stem for a short distance then branching off. *Hydrocladia* 4 mm long. *Hydrothecae* close-set at 45° to hydrocladial axis, marginal teeth deeply cut, the second anterior pair outwardly bent, the unpaired anterior tooth well developed, the hatchet shape becoming more pronounced distally along the branch. *Median nematotheca* variable in length, just overtopping margin in proximal region of hydrocladium, increasing to twice the height of hydrotheca distally, standing well out from the margin, the terminal aperture at the same time broadening out into 2 lobes. *Corbulae* immature, with 4–11 pairs of gonohydrocladia; immature gonophores in corbulae with more than 10 leaflets. **Colour**—variable, light to dark brown.

***Thecocarpus divaricatus*** (Busk) var. ***briggsi*** Bale, 1926: 22, fig. 5.

*Aglaophenia divaricata* (Busk). Bale, 1884: 162, pl. 15, fig. 8, pl. 17, fig. 7.

*Aglaophenia divaricata* var. *acanthocarpa*? Bale, 1915: 312.

**Records:** R, 24–33; S, 18 m, on fragments of red algae and *Caulerpa simpliciuscula*; Stn. F, 65 m, on *Symplectoscyphus subdichotomus*.

**Material:** A few infertile stems in each colony. *Stems* to 1.5 cm long, unbranched, monosiphonic, given off singly from a winding hydrocladia. *Hydrocladia* flexuous, distant, each internode with 2 distinct septa. *Hydrothecae* with 4 pairs of marginal teeth, similar in shape and size, the median anterior tooth not well developed. *Median nematotheca* slightly longer than hydrotheca, following curve of the abcauline wall, becoming erect just behind margin, terminal orifice round, in some cases broadening into lateral lobes; cauline nematothecae larger than laterals, bent around stem, orifice facing posteriorly. **Colour**—brown.

**Remarks:** This is the first record of the var. *briggsi* from S. Aust. (Other locality: Port Jackson, N.S.W.).

***Thecocarpus divaricatus*** (Busk) var. ***cystifera*** Bale, 1915: 314.

FIG. 72

**Records:** R, 24–33 m, S, 24 m, epilithic on vertical rock faces.

**Material:** Abundant infertile colonies. Colonies of 1–3 stems to 10 cm high, growing from a small common fibrous rootstock. *Stems* thick, woody, brittle, lightly fascicled, the polysiphonic tubes running up the main stem and branching out alternately in one plane, giving the colony a distinct "front and back" aspect. Proximal region of stem bare, showing scars where branches and hydrocladia have dropped off. *Hydrocladia* to 13 mm long. *Hydrothecae* set at an angle of 45° to hydrocladial axis; marginal teeth of similar size, evenly spaced, the sinus between often wide and shallow. *Median nematotheca* following curve of the abcauline wall, terminating just below margin, terminal orifice round; cauline nematothecae large, egg-shaped. **Colour**—light brown.

**Remarks:** Bale (1915) described, but did not figure the variety *cystifera*, distinguishing it from other varieties of *T. divaricatus* only on the presence of the enlarged cauline nematothecae.

**Remarks on the varieties of *T. divaricatus*:**

It is of interest that the 3 varieties of this species, recognized by Bale, are recorded for the first time from one locality. *T. maccovi*

has previously been reported from various localities along the Victorian coastline (Bale 1884) and from South Australia (Blackburn 1942; Shepherd & Watson 1970). *T. cystifera* has been recorded only from South Australia (Bale 1915) and *T. briggsi* only from New South Wales (Bale 1926). The only information hitherto available on the macrostructures of the hydrocaulus is given by Bale (1884) who described the typical form as having "numerous divergent branches and very dark colour" and the var. *maccayi* as a "dwarf form". (The larger "typical" form, i.e. *A. divaricata* Busk, a very common and distinctive species of the south-eastern Australian coastline, was not found at Pearson I., despite careful search). The distinction between the varieties has therefore largely rested on microstructures alone.

Although some intergradation in structure does exist between the varieties, the material from Pearson I. now enables a clear distinction to be made in both micro- and macro-structures, as well as environmental preferences. *T. maccayi* and *T. briggsi*, because of their similarity in size and overlap of substrate preferences, are difficult to distinguish in the field, but they are easily separated on micro-structures: *T. cystifera* although unmistakable in size and growth habit, has hydrothecae almost identical with those of *T. briggsi*. *T. maccayi* was the only variety fertile at the time of collection. The gradation in micro- and macro-structures, habit, and apparent difference in fertile season of the varieties, suggests incipient speciation within the *T. divaricatus* group. Distinguishing features between the varieties from Pearson I. are tabulated below.

	<i>T. maccayi</i>	<i>T. briggsi</i>	<i>T. cystifera</i>
Stem length	medium, 4 cm	small, 1.5 cm	large, 10 cm
Colony	lightly fasciated, branched	unfasciated, unbranched	fasciated, branched in 1 plane
Mesial nematotheca	twice length of hydrotheca, orifice lobed	to hydrothecal margin, orifice round to lobed	to hydrothecal margin, orifice round
Cauline nematotheca	normal size, shape	normal size, shape, facing posteriorly	large, ovate
Marginal teeth	sharp, deep	sharp, deep	wide, shallow
Habit	epiphytic	epiphytic-epizoic	epilithic

#### *Lyncarpus mulderi* (Bartlett, 1907).

##### FIG. 73

*Aglaophenia mulderi* Bartlett, 1907: 66. Mulder & Trebilcock, 1916: 73, pl. 10, fig. 3.

**Records:** Among algae: no other data recorded.

**Material:** A fragment 1 cm long, the distal end of a fertile stem. The specimen conforms to descriptions of Bartlett and Mulder & Trebilcock. *Gonosome* comprising 2 gonophores—1 male and 1 female, in an open corbula arising from a primary hydrocladium. Primary hydrocladium with thecate proximal internode, followed by a swollen internode bearing 3 nematocladia and gonophores. Nematocladia 0.75–0.84 mm long (but may be broken) each bearing a single row of nematothecae. Gonothecae round, laterally compressed; female, 1.35 mm in diam., slightly larger than male, packed with mature ova, blastostyle almost filling gonothecal cavity; male gonophore surrounded by a blastostyle of the same shape, but of smaller size than the female.

**Remarks:** This is the first record of a species referable to the genus *Lycarpus* from southern Australian waters. As earlier descriptions were derived from fragmentary infertile material, it was assumed, in the absence of the gonosome, to belong to the closely related genus *Aglaophenia*, common in southern Australia. This is the third record of this rare but distinctive species, and the first record for S. Aust. (Other locality—Bream Creek, Vic.).

***Halicornopsis elegans*** (Lamarck, 1816). Bale, 1914a: 56; 1915: 303. Briggs, 1914: 309, Blackburn, 1942: 107. Shepherd & Watson, 1970: 140.

*Plumularia elegans* Lamarck, 1816: 129.

*Halicornopsis avicularis* Bale, 1882: 26, pl. 13, fig. 3; 1884: 185, pl. 10, figs. 1, 2, pl. 19, fig. 32.

**Records:** R, 33 m, epilithic, and on bryozoa and red algae.

**Material:** One small infertile colony. *Stems* to 3 cm long, branched.

**Remarks:** The colonies were comparatively small and the individual stems short for the species.



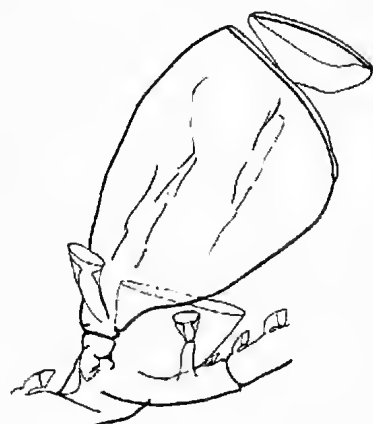
68



69



70



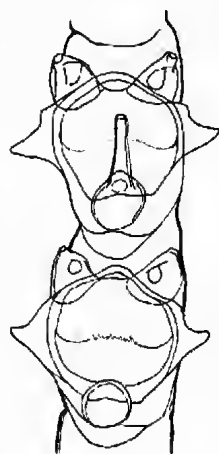
71



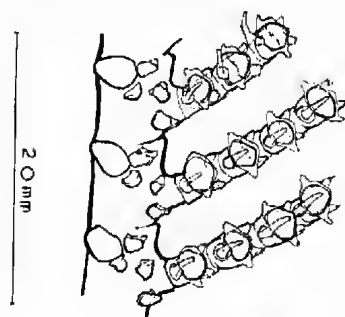
72

0.5 mm

0.25 mm

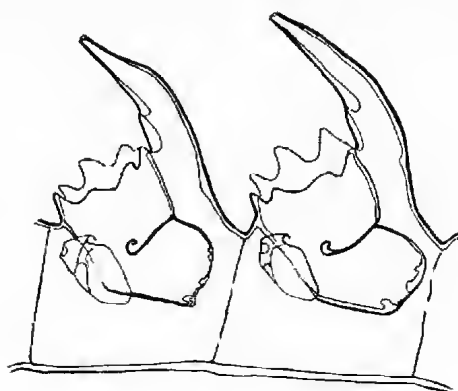


75



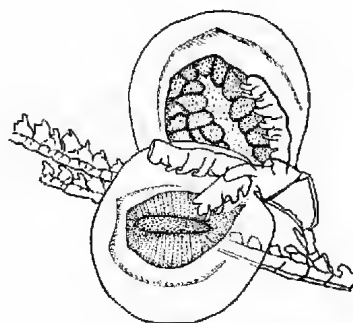
74

2.0 mm



76

0.5 mm



73

2.0 mm



***Halicornaria longirostris* (Kirchenpauer, 1872).**

Bale, 1884: 181, pl. 13, fig. 7, pl. 16, fig. 3, pl. 19, fig. 30. Shepherd & Watson, 1970: 140.

*Aglaophenia longirostris* Kirchenpauer, 1872: 28, pl. 1, fig. 19, pl. 5, fig. 20.

**Records:** R, 18–33 m, epilithic on rock walls, on *Herdynania momus*, red algae, and bryozoa.

**Material:** Abundant infertile colonies. Stems to 7 cm long, with 1–2 proximal branches. Colour—pale straw colour.

**Remarks:** The colonies fall into 2 groups—those with long stems, and those with short stems. The larger colonies, comprising clusters of longer stems (up to 7 cm) were either epilithic or epizoaic, whereas the shorter stems (up to 3 cm) growing singly, were epiphytic on algae. There is no difference in micro-structures between these two ecologically distinct stem types.

***Halicornaria prolifera* Bale, 1882: 34, pl. 14, fig. 5; 1884: 183, pl. 14, fig. 1, pl. 16, fig. 10. Ritchie, 1911: 858, pl. 85, figs. 2, 3.**

**Records:** R, 30 m, epilithic.

**Material:** One infertile unbranched colony. Stem 8 cm high. *Hydrocladia* 0.7 mm long, given off at an acute angle to the stem. Anterior and posterior cauline nematothecae with 3, sometimes 4 orifices; median hydrocladial nematotheca extending just below thecal margin. Marginal teeth shallowly scalloped, the middle pair slightly everted.

**Remarks:** The specimen agrees in most respects with Bale's description of *H. prolifera*, except that the median nematothecae are a little shorter than those described by Bale, and all the cauline nematothecae have 3 orifices. The hydrothecal margin is circular in anterior view, similar to Ritchie's (1911) specimens. This is the first record of *H. prolifera* from S. Aust. (Other localities—N.S.W. and Vic.)

***Halicornaria aurea* n.sp.**

**FIGS. 74–76**

**Type Material and Records:** Holotype, NMV G2088, microslide; G2107, preserved

material, remainder of holotype colony—R, 33 m, epilithic on rock walls; paratypes, G2089, microslide, G2108, preserved material, remainder of colony—R, 33 m, epilithic; G2090, microslide, G2109, preserved material, remainder of colony—R, 27–30 m, epilithic on rock walls; SAM microslide.

**Description from holotype:** Colony 6 cm high, growing from a small fibrous rootstock. Stem monosiphonic, lower stem 1 mm in diam., athenate, divided into internodes, nodes transverse, proximal internodes with circular pits where cauline nematothecae have dropped off. First branch 2 cm above base, all branching thereafter dichotomous, at an angle of about 40°, the branches becoming somewhat convergent distally, then rebranching. Branching repeated 6–7 times, always in the one plane. Branch internodes short, 0.60–0.69 mm, divided by indistinct transverse nodes, diam. at node, 0.66–0.84 mm. *Hydrocladia* to 5 mm long, alternate, 2 on an internode, given off after first branching of main stem, standing out stiffly at an acute angle from the branch, giving the colony a decidedly "front and back" aspect. Hydrocladial internodes 0.28–0.31 mm long, nodes almost perpendicular to the axis, indistinct, no internodal septa. *Hydrothecae* squat, set at an angle of 50° to hydrocladium, 0.23–0.26 mm deep, filling internode; adcauline wall straight, fixed part 0.12–0.14 mm long, free part 0.03–0.05 mm long; abcauline wall 0.17–0.19 mm long, divided in the middle by a long intrathecal ridge projecting slightly forward more than half way across thecal cavity; base of hydrotheca flat, with a small knot of denticles on the adcauline side marking the hydropore. Margin 0.17–0.29 mm in diam., with 8 teeth—3 pairs of prominent bluntly pointed teeth, the middle pair the longest, outwardly bent, the anterior pair erect, the posterior pair slightly everted; 1 low posterior tooth, often obsolete, and 1 small anterior tooth below the median nematotheca. *Median nematothecae* almost twice the height of the hydrotheca, 0.28–0.40 mm long, 0.05–0.07 mm wide at

Figs. 68–71. *Plumularia australiensis* n.sp. Fig. 68.—Part of stem. Fig. 69.—Part of hydrocladium, enlarged. Fig. 70.—Male gonotheca. (Figs. 68–70 from holotype). Fig. 71.—Female gonotheca, from paratype.

Fig. 72. *Thecocarpos divaricatus* var. *cystiferus* Bale. Part of branch with hydrocladia removed to show cauline nematothecae.

Fig. 73. *Lytocarpus mulderi* (Bartlett). Open corbula with male and female gonophores.

Figs. 74–76. *Halicornaria aurea* n.sp. From holotype. Fig. 74.—Part of stem with hydrocladia on one side removed to show cauline nematothecae. Fig. 75.—Hydrothecae, anterior view. Fig. 76.—Hydrothecae, lateral view.

base, tapering distally and inclined forward, terminal aperture small, circular, lateral aperture distinct. *Lateral nematothecae* small, 0.11–0.13 mm long, saccate, not reaching thecal margin, 1 small terminal aperture on a short outwardly turned neck, and 1 lateral aperture facing inward towards the hydrotheca. *Gonotheca* absent. *Colour*—amber.

*Remarks:* The marginal thecal teeth exhibit the variations in length and shape characteristic of *Halicornaria*. The teeth are normally long, the middle tooth being the longest of the 3 on each side. The median nematothecae are all of nearly equal size, and show little tendency towards increase in length in the distal region of the hydrocladium.

*H. aurea* resembles 2 other southern Australian species of *Halicornaria*—*H. superba* Bale, and *H. baileyi* Bale. It differs from the former in minor micro-structures, the marginal thecal teeth of *H. superba* being sharper and narrower than those of *H. aurea*, the median nematotheca of *H. superba* is larger, and the lateral nematothecae have 1 lateral and 2 terminal apertures. In *H. aurea* the laterals have only 2 apertures, 1 facing inward and the other outward; as they are very small they are sometimes difficult to distinguish. In macro-structures, however, *H. aurea* is easily distinguished from

*H. superba*, whose stems are long, gracefully plumose, and yellow-green in colour. In size, growth habit, and colour, the colonies of *H. aurea* are indistinguishable from *H. baileyi*. They are however, quite different in micro-structures.

*H. aurea* is an abundant species on rock faces exposed to surge.

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